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The

IRON AGE

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MARCH 24, 1949

HOW BLISS PRESSES

ARE IN THE PICTURE

AT EASTMAN KODAK

Several hundred presses at Camera Works produce wide variety of equipment

Satisfactory performance under intensive operating conditions, prompt maintenance and repair service, and engineering cooperation when new designs and tooling are up for consideration—these are the reasons why the high percentage of Eastman Kodak's press equipment is Bliss.

You can put a 90-year fund of production engineering knowledge to work on your pressed-metal problems, too, by sending today for a Bliss Sales Engineer.

E. W. BLISS COMPANY, DETROIT 2, MICHIGAN

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery



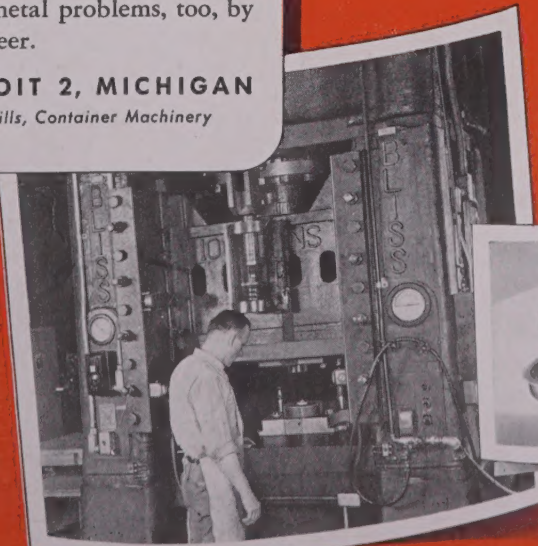
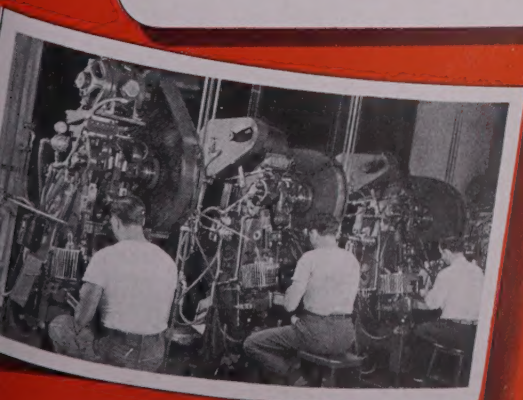
Close-up of Bliss #307-A press used to coin winding knobs for Kodak Tourist Cameras.

Progressive dies produce various parts for the Baby Brownie Special Camera on Bliss automatic presses.



Coining shutter cases on Bliss 1000-ton hydraulic press. (Inset) Before and after samples. Steps on inside of right-hand sample are held to .001" for position and flatness. Below are blank and two parts of head for tripod. Top part, center, has three depressions—held smooth and hemispherical. Serrations in bottom, right, are accurately radial, sharp and uniform.

a battery
Bliss #19-C
le presses
r a variety
dary oper-
accuracy is
unt.



BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY IN THE WORLD



Speedaire-driven tumbler in plant of Kaydon Engineering Corp., manufacturers of all types of ball and roller bearings from 4" ID to 120" OD.

The white outline on the photograph indicates the much larger size of standard drive required to do the work of Speedaire.

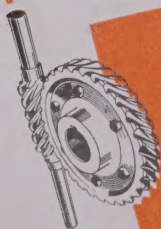
Dollar saving is 35.3% with **SPEEDAIRE**

THIS large tumbling barrel runs 24 hours a day, carrying 2,200 pounds of Kaydon bearing rollers. The Speedaire unit has proven to be the best of several drives tried in this heavy duty service. In addition to giving complete satisfaction, Speedaire saved the company \$221.00, a 35.3% saving over the cost of a conventional worm gear unit of equal capacity.

Speedaire is Cleveland's new fan-cooled worm-gear speed reducer. Because it is fan-cooled, Speedaire will do more work—will deliver up to *double the horsepower* of standard worm units of equal frame size, at usual motor speeds. It can be installed economically on many applications where other types have been used heretofore—giving you the advantages of a compact right-angle drive. Speedaire gives the same long, trouble-free service characteristic of all Clevelands.

For full description, send for Catalog 300. The Cleveland Worm & Gear Co., 3252 E. 80th St., Cleveland 4, O.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.



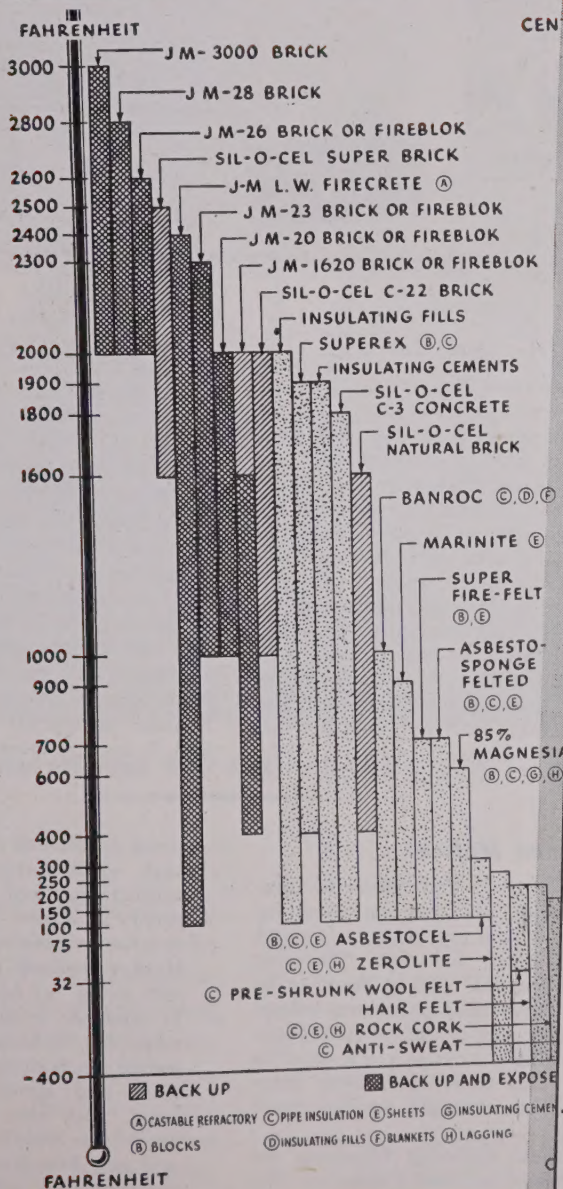
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Worm Gear

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chart...

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Please send me copy of Johns-Manville Insulation Chart IN-6D.

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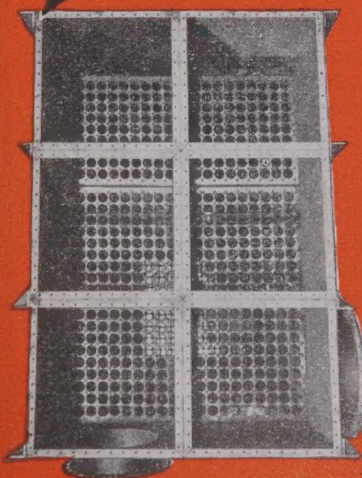
EVERY

For further information write your nearest J-M office or Johns-Manville, 22

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We are prepared to furnish
any type of fabrication in
any metal to your particu-
lar specifications. Write...

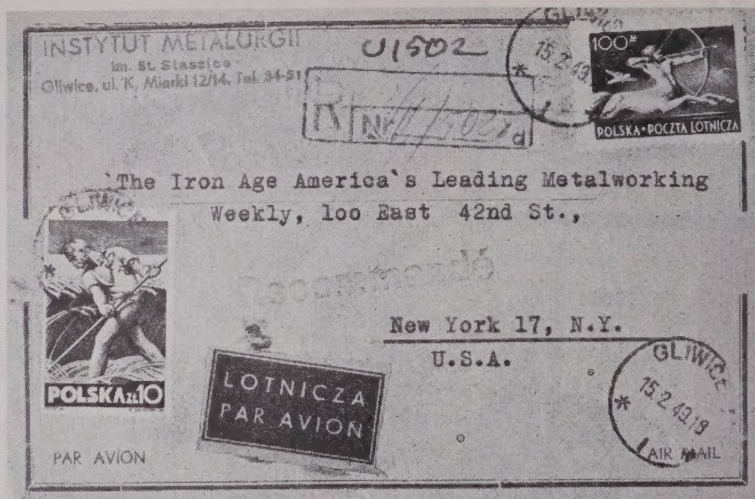
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LS-2

Fatigue Cracks

BY C. T. POST



Behind the Iron Curtain

• • The State Department will be glad to learn that the Iron Curtain has been given a Charpy test and shows an impact value of only 4.5 ft lbs. The pendulum on the modified testing apparatus consisted of your f.f.j. As evidence of the test results we offer this envelope received from the Instytut Metalurgii of Gliwice, Poland, addressed to "THE IRON AGE, America's Leading Metalworking Weekly."

This familiar identification of your f.f.j. is better evidence of understanding and appreciation of the finer things in American life

than anything that the Voice of America could hope to turn up in a year's broadcasts. Note that the Poles took no chances on their letter going to any old Iron Age, but made dead certain that it went straight to the mark.

We naturally had supposed that the word *Recommandé* stamped across the envelop was an indication that some enthusiastic French postal employe along the way had endorsed a recommendation of the addressee. It was a great disappointment to look it up in our old Fraiser et Squair grammar and find it merely meant "registered."

Time and Motion

• • For years your favorite family journal has been harassed by readers with a precise turn of mind who question the term "favorite family journal." All of them, to be sure, have readily acknowledged that IRON AGE is the favorite journal of almost anyone you'd want to know. But there have been some mental reservations on the word family.

To these doubting Thomases we recommend without hesitation the current No. 1 best seller, "Cheaper by the Dozen" by Frank B. Gilbreth, Jr. and Elizabeth Gilbreth Carey. The title, as you know, refers to the 12 offspring of the late Frank B. Gilbreth, Sr., and Lillian Gilbreth, whose fame heretofore rested on their activity as bell-wethers in time and motion study. On page 140 we find this tableau of life at the Gilbreths:

"The desk on which Anne's bassinot rested was within

reach of the bed and was piled high with notes, IRON AGE magazines, and the galley proofs of a book Dad had just written on reinforced concrete. Mother utilized the "unavoidable delay" of her confinement to read the proofs. At night, when the light went out, Dad would reach over into the bassinot and stroke the baby's hand. And once Mother woke up in the middle of the night and saw him leaning over the bassinot and whispering distinctly:

"Is ou a ittle bitty baby? Is ou Daddy's ittle bitty girl?"

Don't get the idea that the Gilbreths raised a brood of 12 solely to make sure your f.f.j. would keep coming to the house. But it should not be amiss to point out that "the hand that rocks the cradle rules the world" particularly if the reading matter alongside the cradle is well chosen.

DODGE Manufacturing Corporation
gets "25 minute service"
from J&L Warehouse

**J&L
STEEL**



Order received 9:10 A.M.—Delivery truck on way 9:35 A.M.

At 9:10 on a Saturday morning, a telephone rang at Jim Sproat's desk in the J&L Warehouse in Chicago. At the other end of the wire, 80 miles away in Mishawaka, Indiana, C. L. Mechling, purchasing agent of the Dodge Manufacturing Corporation, said he needed some help . . . quick. He had to have seven bars of 2-7 16" cold finished steel shafting, 16 and 20 feet long. They were needed for the power transmission system in a big industrial plant. Until they arrived, the plant could not operate. When could he have them?

There was some fast footwork. In the warehouse was a J&L truck which was going through Mishawaka. In the warehouse was steel of the proper grade and size. At 9:27, the steel was being pulled out of racks. At 9:35 the truck was on its way.

Unusual? Certainly, it was unusual. J&L Warehouses cannot get every order on its way in 25 minutes! But it happens often enough to make a lot of customers lean heavily upon them.

Quick service is a habit at J&L Warehouses—part of their stock-in-trade. Located at strategic distri-

bution centers, they provide close-at-hand, convenient, dependable sources of supply for all who need steel in a hurry. Stocks are large and diversified, including not only the more common grades of steel, but many special grades as well—all of J&L Controlled Quality.

Listed below are the 7 Jones & Laughlin Service Warehouses and their phone numbers.

**When you need steel — quickly —
call your J&L Warehouse first!**

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CINCINNATI 2, OHIO.MAin 2323
DETROIT 7, MICH.WAlnut 0470
MEMPHIS 1, TENN.5-1625
NEW ORLEANS 6, LA.FRanklin 1131
PITTSBURGH 3, PA.HEmlock 1000
***LONG ISLAND CITY 1, N. Y.**
.IRonsides 6-8700

*Operated by Jones & Laughlin Steel Service, Inc.

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY and JALLOY (hi-tensile steels).

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start with **WYANDOTTE**

IN THE complete Wyandotte line, there's a product especially adapted to each and every barrel-finishing operation.

Wyandotte Burnishing Compound 317 gives ball-burnished parts of zinc a brilliant finish. Its action is not affected by water hardness. Its cutting qualities help speed the tumbling of steel, brass, copper and zinc with stones. It is free-rinsing and leaves no soap "scum" on the work or in the barrel.

Wyandotte Burnishing Compound 320 gives a highly satisfactory finish to parts of brass, copper, bronze or steel.

Wyandotte Burnishing Compound 321 contains a non-toxic bright-

ening agent which provides ball-burnished parts of steel, copper, brass and nickel with a high luster. It does not require the addition of sodium cyanide.

Wyandotte Burnishing Powder is economical for ball-burnishing or tumbling steel with stones. *Wyandotte 80* (for tumbling steel) and *Light Alloy No. 1* (for zinc and aluminum) have thorough detergent action on light soil, in hard or soft water.

For consistently fine results, at low cost, specify *Wyandotte Burnishing and Burring Compounds*. Your Wyandotte Representative will be glad to give you complete details. He's only a telephone call away.



WYANDOTTE CHEMICALS CORPORATION • WYANDOTTE, MICHIGAN
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Dear Editor:

CORROSION CONTROL

Sir:

There will be a conference this coming summer on conservation and utilization of resources sponsored by the United Nations. I have been requested through the Secretary of the Interior to present a paper at this conference on costs of corrosion and corrosion control.

In arriving at a reliable estimate of the overall tax imposed by corrosion, it would be helpful to have estimates, if such exist, from metal producers and fabricators on losses of their particular products by corrosion. The estimate cost should include not only metal replacements, but also labor costs of fabrication and installation. Presumably, intangible costs should also be added; such as loss of product, shutdown and explosion damage. But these are usually difficult to estimate and are probably not available generally.

I should appreciate knowing of any general information you may have on this subject that would be potentially useful in a survey of this kind.

H. H. UHLIG
Assoc. Prof. of Metallurgy
Mass. Institute of Technology
Cambridge, Mass.

● We shall do our best to round up some data and estimates for you and will print your letter on the possibility that our readers can make some suggestions.—Ed.

CORE BAKING

Sir:

With reference to the article "Core Baking, 2 Minutes v. 4 Hours" in the Feb. 3 issue, could you give us some idea of the cost of the Ther-Monic tunnel-type unit mentioned. We would be grateful for any further information pertaining to this equipment. Wouldn't this high frequency affect radio broadcasting in the vicinity? Also, is it possible to bake cores by infrared methods?

R. S. FORBES
Taylor-Forbes, Ltd.
Guelph, Canada

● The cost of such a unit is about \$14,000. The model discussed was designed and built as a frequency converter. Electrical energy from a 3-phase, 205 to 245 v, ac line is converted into radio frequency energy at approximately 15 million cycles per sec, suitable for efficiently heating sand cores by using the dielectric loss of the core for the generation of heat within it. Other than the usual electrical losses in the generator components, no energy is generated except in the core where the heat is desired. In conformance with FCC regulations, the tunnel is provided with shielding to prevent radio broadcasting interference. Cores made with liquid synthetic binders have been baked by infrared methods. Some references on this subject, as well as

Federal

FIRST IN RESISTANCE WELDING

BENCH WELDERS

Federal Series

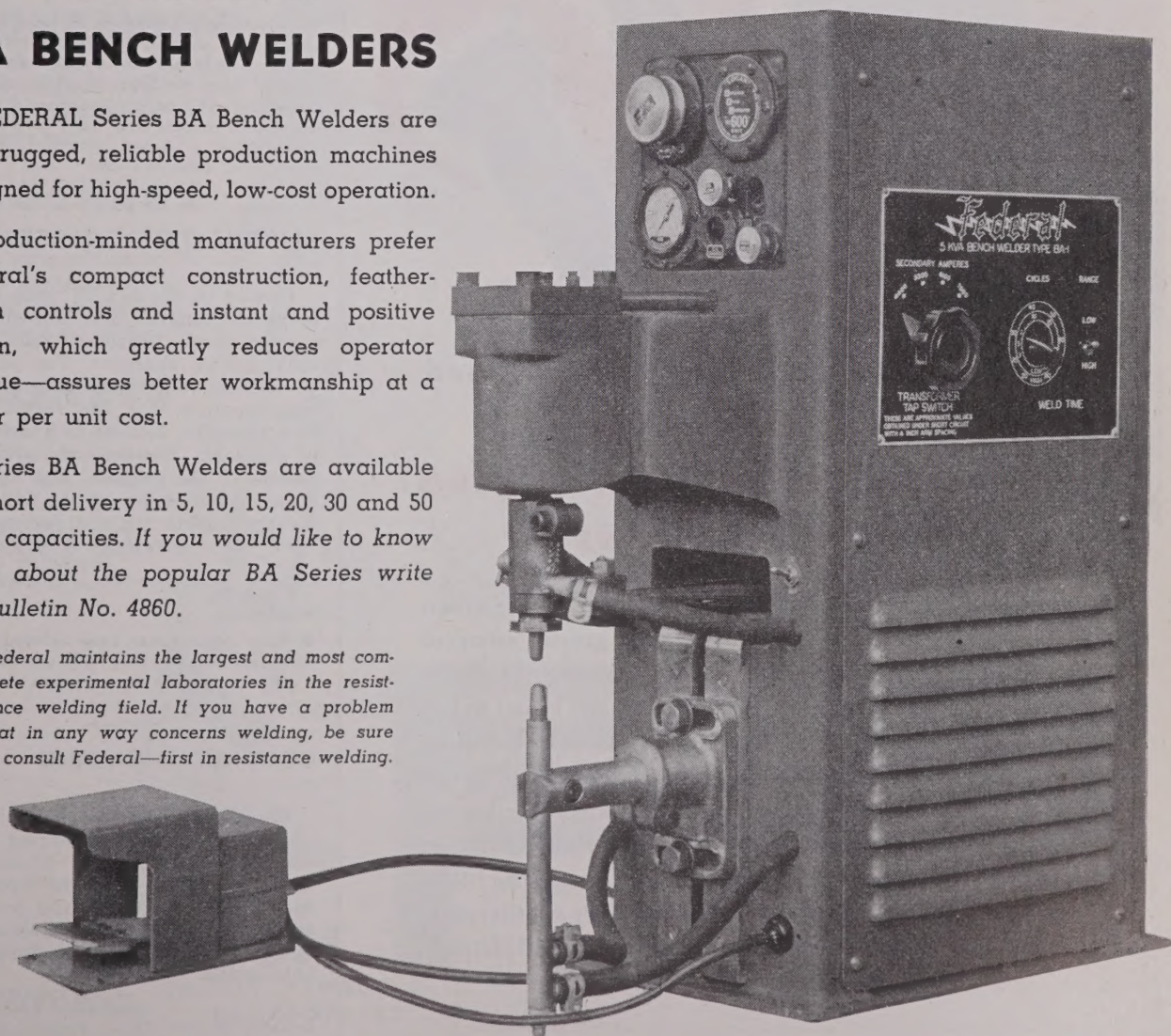
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FEDERAL Series BA Bench Welders are rugged, reliable production machines designed for high-speed, low-cost operation.

Production-minded manufacturers prefer Federal's compact construction, feather-touch controls and instant and positive action, which greatly reduces operator fatigue—assures better workmanship at a lower per unit cost.

Series BA Bench Welders are available on short delivery in 5, 10, 15, 20, 30 and 50 KVA capacities. *If you would like to know more about the popular BA Series write for Bulletin No. 4860.*

Federal maintains the largest and most complete experimental laboratories in the resistance welding field. If you have a problem that in any way concerns welding, be sure to consult Federal—first in resistance welding.



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The Fasteners that add *EXTRA*ordinary strength to your product *EXTRA*ordinary speed to its assembly----



Kaufman Cold-Forging Processed Cleveland High Carbon Heat Treated Cap Screws

• The extra toughness of Cleveland High Carbon Heat Treated Cap Screws adds greater safety to your product; extra precision forming speeds assembly, minimizes rejects. These extra values to you are the result of the Kaufman Double Extrusion Process of cold forging—a method that assures you stronger threaded fasteners than any other known process. It pays you to specify and buy Cleveland High Carbon Heat Treated Cap Screws. The Cleveland Cap Screw Co., 2917 East 79th St., Cleveland 4, Ohio; Warehouses, Chicago and Philadelphia.

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Top Quality
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ORIGINATORS OF THE
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Specialists for more than 30 years in
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Ask your jobber for Cleveland Fasteners

the names of infrared equipment manufacturers who could give you additional information, have been sent.—Ed.

PICKLE LIQUOR RECOVERY

Sir:

European steel mill friends of ours approached us with the following problem. They accumulate pickling liquor from which they do not recover iron sulfate or sulfuric acid. They advise us that there are two methods known in the United States according to which a recovery of iron sulfate and sulfuric acid is possible by an electrolytic method. We would appreciate it if you would give us information concerning these methods.

ALBERT SULZBACH

American Nickel Alloy Mfg. Corp.
New York

• Electrolytic methods, in general, have not proved economical. Tear sheets of the article "Regeneration System for Pickle Liquor," from the Sept. 30, 1948, issue have been sent. This article describes a recently developed process and gives references to many other proposed processes, including electrolytic methods.—Ed.

AMORTIZATION CHARGES

Sir:

I noted in the Jan. 27 issue the excerpt of Admiral Ben Moreell's discussion and proposal relative to amortization charges. The phase of the article which most interested me was mention that the result would in a measure, amount to a deferment of payment. However, the article did not detail the proposal and I wonder if you have copies of the full statement available for distribution.

CHARLES H. HELSPER
Machinery Division

Dept. of Commerce, Office of Domestic
Commerce
Washington

• Your request has been relayed to our Pittsburgh office. They will see that you receive a copy of the complete statement. —Ed.

CONTINUOUS CASTING

Sir:

We are interested in the articles on continuous casting appearing in the Aug. 19 and 26, 1948 issues. We would appreciate receiving 6 copies of each. We thank you for these considerations and are always looking for the interesting articles in your publication.

C. G. CHAMBERS
Supervisor Laboratories

General Motors Corp., Process Development
Section
Detroit

PAPER CLIP MACHINERY

Sir:

You were kind enough to help us locate wire nail and barbed wire machinery manufacturers, and we are now writing to inquire if you can give us the names and addresses of manu-

AVAILABLE RIGHT NOW!

SHELVING

Entire framework of steel. Hardwood shelves, steel reinforced. Instantly adjustable without tools. No bolts or nuts.

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Entire frame and doors of steel. Shelves, sides and backs of hard, durable Masonite, steel reinforced. Single or double tier. Wide range of sizes.

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Entire frame and doors of steel. Sides, backs and shelves of hard, durable tempered Masonite, steel reinforced. Shelves adjustable every 2" without tools.



• Write, wire or mail the coupon for Descriptive Catalog, giving complete specifications and prices.

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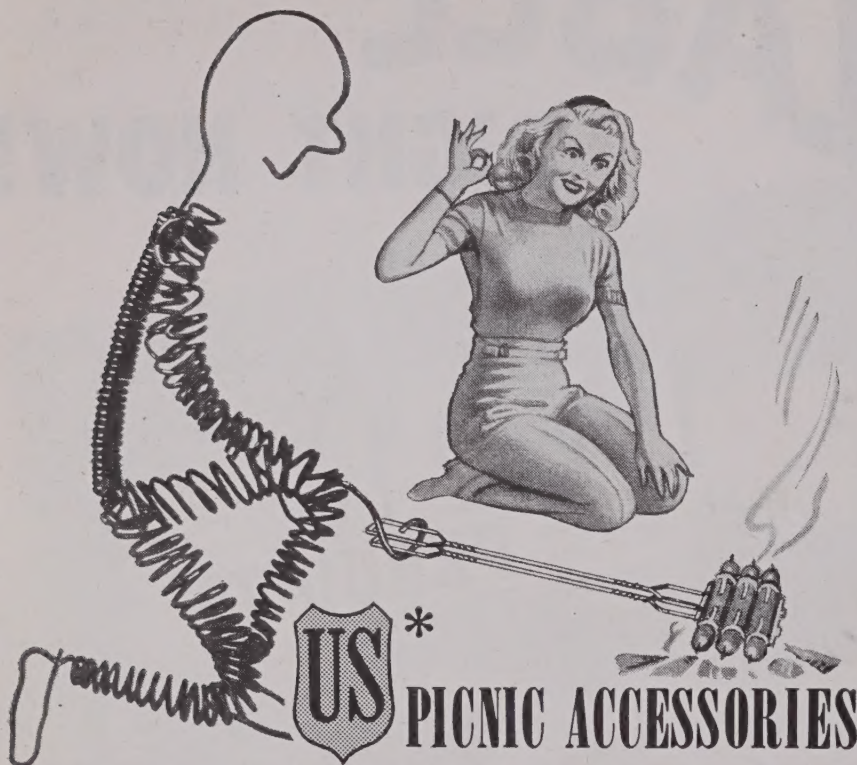
LYON Metal Products, Inc.
336 Monroe Avenue, Aurora, Ill.
Please send me free copy of your Bulletin No. 900.

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Company Name _____
Address _____
City _____ State _____

A PARTIAL
LIST OF
LYON
PRODUCTS

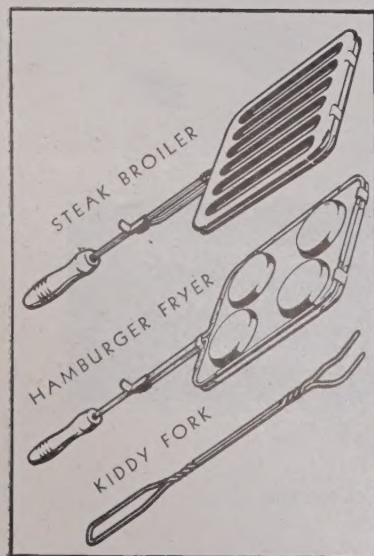
- Shelving
- Lockers
- Wood Working Benches
- Economy Locker Racks
- Kitchen Cabinets
- Display Equipment
- Hanging Cabinets
- Welding Benches
- Filing Cabinets
- Cabinet Benches
- Folding Chairs
- Drawing Tables
- Storage Cabinets
- Bench Drawers
- Work Benches
- Drawer Units
- Conveyors
- Shop Boxes
- Bar Racks
- Bin Units
- Tool Stands
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U. S. Picnic Accessories give added enjoyment to the art of campfire cookery.

You'll notice that wire is of prime importance in the construction of these items. For this reason the manufacturer specifies Keystone wire that has an **extra brite finish** for added sales appeal . . . proper ductility to withstand severe twisting operations . . . and the necessary strength to hold its shape under rugged conditions.

Manufacturers know they can depend on Keystone wire to fulfill every industrial wire need.

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PEORIA 7, ILLINOIS



facturers of machinery for making paper clips of various sizes. We would also like information on the manufacturers of machinery for making common house pins, press studs, ladies' hairpins, and hooks and eyes for shoes.

G. D. WOODYARD
Export Manager

California Trading Co.
Los Angeles

● Most of the machinery for producing the items you list would have to be custom made. Lists of manufacturers most likely to be in a position to handle the requirements involved have been mailed.—Ed.

BACK ISSUES OFFERED

A complete set of THE IRON AGE for the years 1941, 1942 and 1943 has been offered. Any taker would be expected to pay packing and shipping expenses from Seattle. Inquiries should be addressed to C. T. Post, Manager, Reader Service Dept., THE IRON AGE, 100 E. 42nd St., New York 17.

RETNING PLANT

Sir:

We are planning on installing a plant for retinning milk cans, ice cream cans and tinware in general. We will appreciate any information you can give us on manufacturers who have suitable equipment.

FRANK J. LAWRENCE

Fargo, Mich.

● A list of companies supplying such equipment and processes has been sent.—Ed.

NEW ENGLAND STEELMAKING

Sir:

I am investigating the possibility of reducing iron ore and making steel in New England using oil as the basic fuel instead of coke. Could you please forward literature or references comparing the basic economies of the two different fuels and information regarding what technical development has been made in the use of oil in blast furnaces.

ISRAEL KRIEGLER

Brooklyn

● In considering the function of fuel in a blast furnace, it is important to remember that coke serves as (1) a source of heat, (2) a reducing agent providing carbon for the reduction of the ore and (3) a support for an ore and limestone burden of several hundred tons while allowing escaping gases to intermingle with the ore. This manifestly introduces some difficult problems if oil is to be substituted as proposed in your letter. At the Corby Works in England, petroleum coke has been used in comparatively small blast furnaces, this product being made and briquetted from refinery residues. Prior to the war, a similar use was proposed on the West Coast, but advancing prices of petroleum and the problem of removing deleterious elements made the proposition uneconomic. Some experimentation has been carried out on the production of pig iron or melting stock in other

Your best bet... Macwhyte ATLAS Braided Wire Rope Slings

No other braided sling has this combination of construction features

1. ATLAS Slings are braided from right lay and left lay endless rope.
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3. All ropes in ATLAS Slings follow a continuous spiral path throughout the entire body length.

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Look to **PERKINS GEARS**

When you use PERKINS precision, custom-cut GEARS, you have done all that can be done to forestall costly rejects or undue maintenance costs due to failures or inefficiency in the power transmission system of your product.

If you were to name the three or four chief factors that you, as a manufacturer of a product using gears, would insist on when choosing a supplier, wouldn't this be the line-up? (a) High quality. (b) Experience of the manufacturer. (c) The manufacturer's ability to deliver—on time—the quantities you need. (d) The best engineering staff and production facilities available. On those, and many other counts, PERKINS stands out. As a result, PERKINS precision, custom-cut GEARS have for years been specified by many manufacturers who are known for the high quality of their own products.

Today! Send us your blueprints or drawings—indicating quantity of gears desired, and we'll quote on your requirements promptly.

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**Helical Gears • Bevel Gears • Ratchets
Worm Gears • Spiral Gears • Ground Thread Worms**

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SPRINGFIELD 2, MASSACHUSETTS**

types of furnaces using substitutes for coke. In these experiments, natural gas has generally been used although some laboratory work has been done with oil. A basic problem is securing complete contact of the reducing agent with the ore, gas offering obvious advantages in this regard. Probably your best source of information on this work is the Metallurgical Div., U. S. Bureau of Mines, Washington. These processes in general have met with a greater degree of metallurgical than economic success.—Ed.

IRON HAND

Sir:

In Assembly Line of the Feb. 24 issue, reference is made to an "Iron Hand" which speeds up forging press operations. This sounds interesting and we would like to know where we can obtain full information on the device.

G. H. GREENE
Chief Engineer

*Bethlehem Steel Co.
Johnstown, Pa.*

● From the inventor—Harry Sahlin, 467 S. Woodward Ave., Birmingham, Mich.—Ed.

COPPER AND BRASS POLISH

Sir:

In Newsfront of the March 3 issue we came upon an item referring to a chromate-type chemical polish for copper, brass and bronze. We would appreciate any information you have in regard to this polish—where it can be purchased, etc.

R. S. HERZ
Metallurgist

*Rossi Continuous Casting Co.
New York*

● The polish is Iridite Metcoat. Allied Research Products, Inc., Baltimore, is the manufacturer and can give you more detailed information.—Ed.

WELDED TANK STEEL

Sir:

On the Newsfront page of the issue of Jan. 13, reference is made to "modified Man-Ten, a high tensile strength steel, that is finding wide application in welded LPG tanks." We would like to know more about this material. At the present time we are using ASTM A-212, Grade B, firebox quality with excellent results.

F. A. HENNINGER
Vice-President

*Rulane Tank Co.
Charlotte, N. C.*

● A. H. Warren, Jr., Carnegie-Illinois Steel Corp., Pittsburgh, can give you full information on the steel.—Ed.

CORRECTION

Sir:

With reference to table I of the article "Magnesium Treatment for Nodular Graphite Cast Iron" in the Feb. 24 issue, the 82-18 alloy included should have read "nickel-magnesium," not "copper-nickel."

CHAS. K. DONOHO
Chief Metallurgist

*American Cast Iron Pipe Co.
Birmingham*

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March 24, 1949

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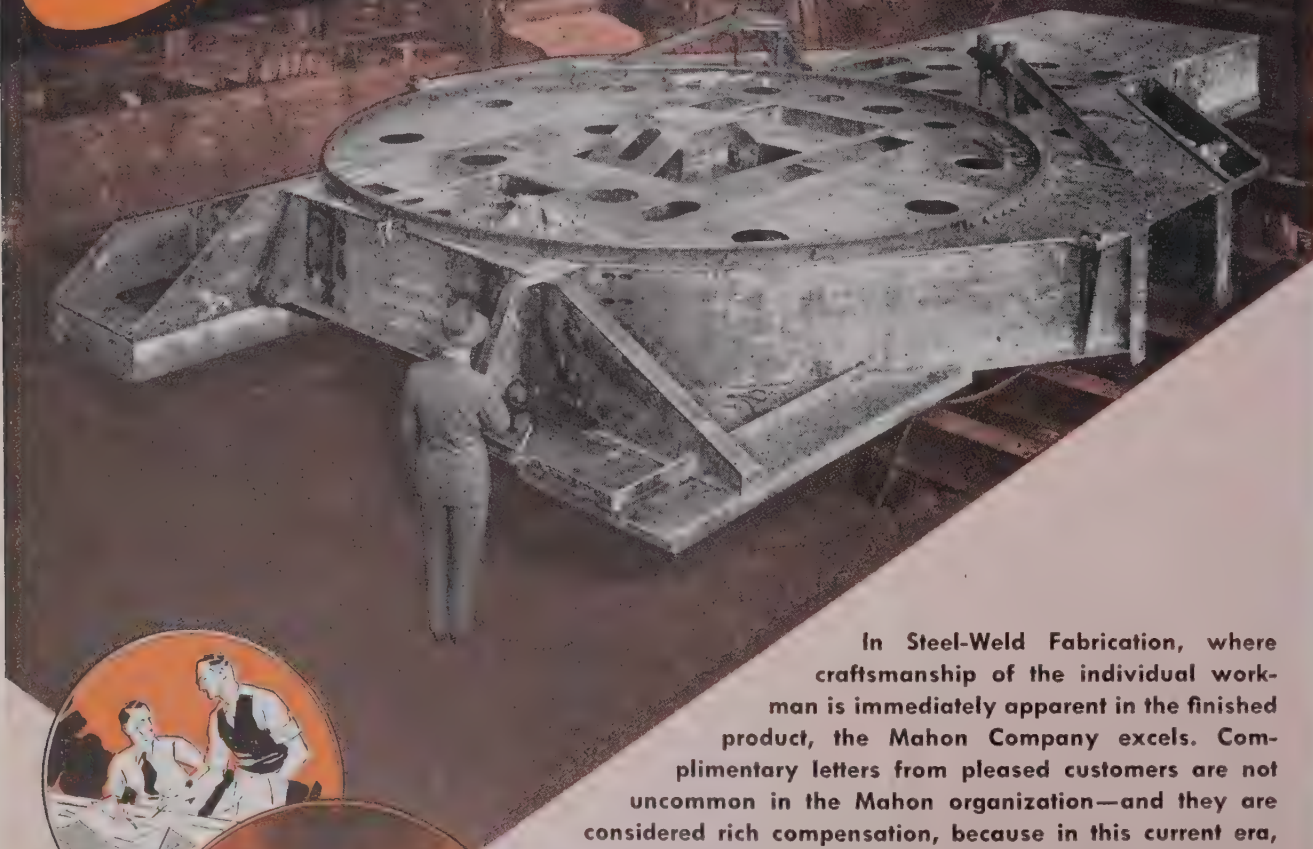
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Security

THE continuous tension in the world, the bitter and apparently irreconcilable rivalry between the East and the West, the belligerent and uncompromising invectives of Soviet diplomacy, have caused this country to examine its defences in terms which have never before been entertained in time of peace.

Within our memories two world wars have been fought at a great cost in blood and treasure. The victories have been dissipated by incompetent and inept diplomacy. However, it would be an error to attribute the peace that was lost to the personal failure of our leaders.

The sorry truth is that the nation has never developed any "international terms of reference" which our statesmen could use as guides. Our goals have never been defined. Having won a war, we never knew where to go next, for the simple reason that we have never assayed our world responsibility or related such responsibility to our own interests and power.

Part of this failure is due to our immaturity, part to an ingenuous penchant for the ideal, and part to a mistaken conviction that our foreign policy must be a bi-partisan policy.

It is only during the last three decades that we have become a world power and taken our place as an equal among the great powers. The incursion into world politics during the first World War left us dismayed and divided. Second thoughts led to isolation and an attempt to rely on the broad seas for insulation against the power rivalries of the world.

It seemed, further, to well-meaning Americans that nations had become the victims of their own armaments, that in the quest for safety with adequate force and weapons, we made war inevitable. We have learned that weakness is no guarantee of peace, that disarmament pacts serve only to limit the power of the honorable and promote the designs of aggressors.

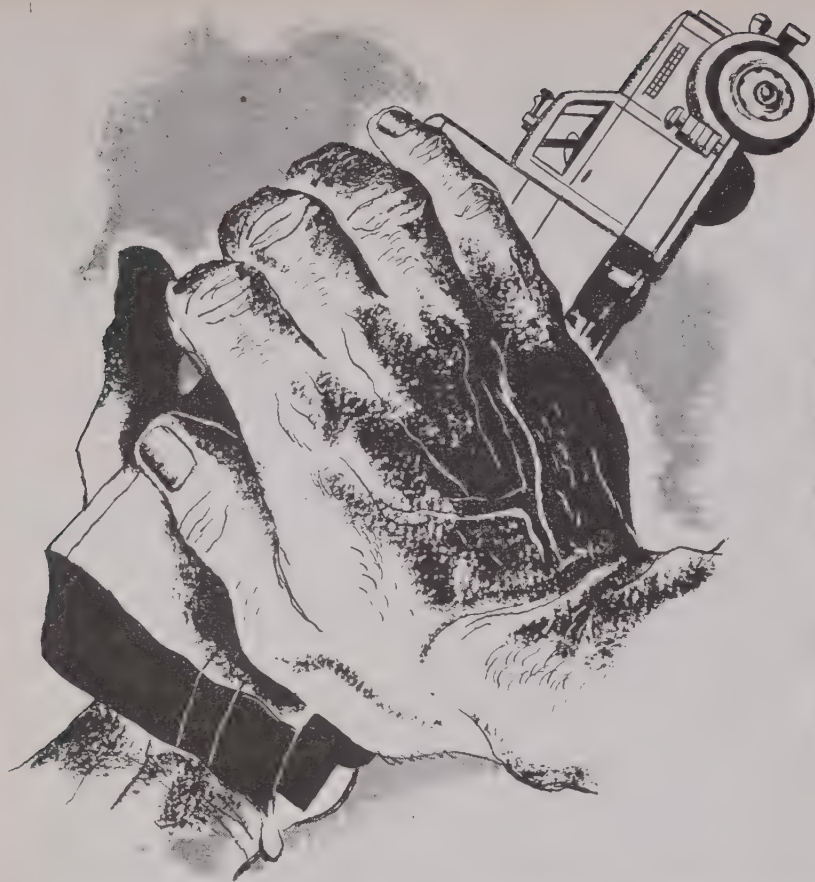
Finally, we made the great error of foreclosing debate on the vital issue of foreign policy. Bi-partisan approval may give the appearance of unity to the foe. It also denies salutary open discussion, sometimes motivated by politics, to be sure, which alone may reveal the strength and weakness of the policy. It is such discussion which provides the public with the fact and logic that will eventually forge a sound policy.

Adequate defense, it is now clear, involves much more than air groups, armored divisions, logistics and military leadership. It includes an economy capable of sustaining the full thrust of war. It involves the cooperation of friendly nations. It calls for a clear-cut definition of purpose. Not only how we fight the war, but what we shall do with the victory are questions the answers to which should be sought before the first bomb is dropped.

Above all, national security calls for a public psychology that will resist hostile assaults in the form of fire and propaganda and support the soldiers and sailors and pilots who operate the cutting edge of our power.

The Hoover Commission, leaning upon its own task force headed by Ferdinand Eberstadt, has submitted a study on national security which should be required reading for all citizens. It is a sober, competent, penetrating study of our security organization revealing a grasp of the problem which is refreshing and reassuring.

Joseph Stagg Lawrence



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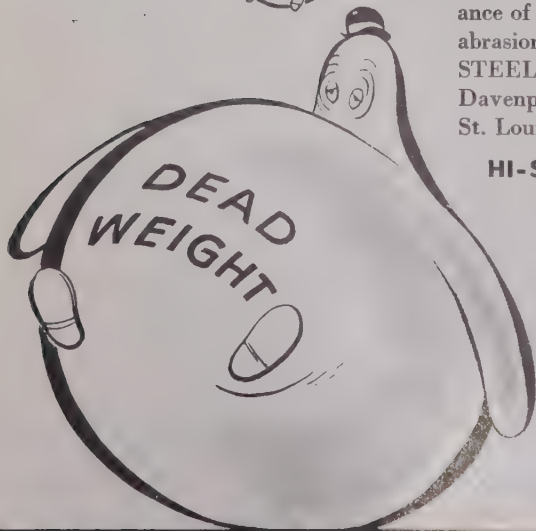
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- Atomic energy was recently used successfully to trace bootleg gasoline. It was impractical to arrange chemical tests so radioactive isotopes were mixed with regular gas at the refinery. Using a radioactive detector, the inspectors were readily able to identify the genuine product and, thereby, isolate the bootleg stuff.
- A new magnetic material, an orientated 50 pct nickel-iron alloy with a rectangular hysteresis loop, will soon be commercially available in the form of toroidally wound cores in a number of standard sizes suitable for what appears to be an unlimited field of applications in electronics.
- Regular steel prices don't seem headed for a decline in the near future—even though some steel consumers have begun agitating for lower costs—and getting them. One way is freight saving by switching to a closer source. Other savings have been realized by halting gray market purchases and cutting down on conversion deals.
- Power plant coal consumption has decreased 3 pct in 1949 despite a near-record electricity output. But use of fuel oil by generating plants is at a record high, nearly 20 pct higher than a year ago. Power plants are well fortified against a coal strike, having about 100 days coal stocks on hand.
- Slag and oxide accumulations can now be eliminated in the connecting channels of two-chamber induction melting furnaces. Manipulation of relative molten metal levels, automatically controlled, produces a cyclic flushing action through the channels that also benefits uniformity of bath analysis.
- With widespread layoffs occurring for the first time since the war, the union-instituted seniority bumpoff system is causing trouble. Many plants in which the different departments handle dissimilar work are running into production and quality snags, as they've been forced to replace trained workers with men from other departments who have no experience or training for the work required. In many cases gripes within the union match the dissatisfaction of management.
- American gold coins are being surreptitiously minted in large volume in several Western European countries. The best of dies are used and the coins are of proper gold content. In France these coins exchange for a much higher number of francs than would the gold contained therein.
- Just as soon as supply definitely tops demand several steel pipe makers will go after the growing market for radiant heating systems. For the past 11 years, A. M. Byers has pioneered in this field with wrought iron pipe, securing the lion's share of the business.
- Measurement of the noise level in mechanical assemblies—determined by a contact probe instrument that is not affected by external air-transmitted sounds—is being used more and more widely for checking machine tools, pumps and other industrial equipment. Portable units for maintenance inspection are used to spot worn machines before major overhauls become necessary. The bearing manufacturers in particular have found the technique invaluable.
- Tap hole trouble in one carbon block bottom blast furnace has been remedied by using a special mud mix. The usual wall thinning has been prevented with a mud mix composed of high volatile coal, good quality ganister and the rest clay.
- Concrete reinforcing bar anchorage is now being rolled into the surface. These deformations produce such an excellent bond that anchoring hooks on the ends are no longer necessary. West Coast engineers are beginning to use such designs and many mills are now equipped to roll bars which meet the bond committee spacing recommendations.
- Better steel supplies have enabled one stove maker in Chicago to cancel their conversion projects. The ingots were sold to a large Detroit motor company and will be used to augment the car makers third quarter conversion program.
- Price reductions announced recently by the Soviet Union are still another step in the preparatory effort to launch the rouble as an international currency. Particular effort will be made to clear trade balances between satellite countries and perhaps for settling balances in a multilateral trading system across The Iron Curtain. At present there is no rate of exchange for the rouble and the Russians may encounter trouble when they attempt to establish one.



IS POWDER metallurgy a cure-all? Does it provide the answer to industry's never-ending quest for a means of producing a better product at less cost?

To answer these questions accurately and honestly, one must examine what has taken place in the last few decades to change powder metallurgy from an art to a science. The accomplishments inspired and fostered by the last war go back, for the most part, to the time when powder metallurgy provided the means for revealing and exploiting the extraordinary properties of tungsten and other refractory metals, such as sintered carbides, contact metals, etc. Those were the days when powder metallurgy was devoted almost exclusively to the development of these and other "special" products.

Since then, however, the strong industry-wide interest in the art of powder metallurgy has resulted in its inevitable evolution into a young science; a science which has begun to progress along two separate courses.

The first course, and the one foremost in the minds of most, is the utilization of the principles of powder metallurgy for the production of materials with unique properties impossible to achieve by any other means. Such products owe their very existence to powder metallurgy: Porous bearings requiring no lubrication; "alloys"

of metals difficult or impossible to alloy by fusion and combinations of metals and nonmetals; metals with controlled porosity for use as non-destructible filters; highly refractory metals which could not be melted or made by any other means; powerful permanent magnets and so on.

The second course taken by powder metallurgy, and in many respects equally as important as the first, is the production of metal parts in direct competition with other methods of production, such as machining, diecasting, precision casting, stamping, forging and combinations of these. This second course is comparatively uncharted and the possibility of running aground on the shoals of over-optimism is always present. Yet it is this uncertain course upon which many phases of industry have chosen to set out. The answers to the above questions should mean the most to these hardy investment adventurers.

Any product or process that is new, or more or less unique, is bound automatically to attract speculative interest. Powder metallurgy certainly fills these requirements—it is a new process and offers unique products. Many people who are experiencing difficulty with existing methods will look for, and perhaps turn to, some other method for a solution to their difficulties. Powder metallurgy in many such instances has turned out to be the solution; but because powder metallurgy is often a new approach does not mean that in all cases it is necessarily the right approach.

No, powder metallurgy is not a cure-all. Because it is new it can, like most new industries, be seriously hindered by the technically unequipped and overzealous salesman with an "after me—the deluge" complex. It can be the means of producing a better product at less cost, but not just any product. Powder metallurgy

No Panacea

By R. L. ZIEGFELD

Acting Secretary,

and

K. H. ROLL

Secretary to the Standards Committee,

Metal Powder Assn.,

New York

possesses many advantages over existing methods of manufacture and it has enough of these to become and remain an important and indispensable tool of the vast metalworking industry. But in order to explore and utilize the advantages of this new tool it is well to know what can and cannot be accomplished with it. By not taking time out for well-counseled and careful thought before replacing established metalworking methods with powder metallurgy methods, it is a real possibility that much money and valuable time and effort could be lost at the expense of industry, not to mention the damage to a good reputation already earned and enjoyed by powder metallurgy and one which it certainly desires to maintain.

Being forewarned of the dangers of marrying powder metallurgy without seeing the bride, exactly what factors must the manufacturer consider who is currently making his product by ordinary methods and who, being alert to modern trends, is anxious to become better acquainted with powder metallurgy?

Three basic factors must be investigated and studied:

(1) *What dimensional tolerances must be met and maintained?* Dimensional tolerances in powder metallurgy depend in large measure upon the product—its shape and the physical properties desired. In order to make a particular part by powder metallurgy a quantity of metal powder of the composition desired must first be pressed at pressures usually in the range of 20 to 40 tsi, in a die of the shape desired. Then the pressed shape (compact) is heated below its melting point in a special furnace to sinter or bond the individual powder particles together and thereby form a homogeneous structure. This process gives the part its physical properties which also are influenced at the outset by the powder particle size and particle distribution. It is during the heating (sintering) operation that dimensions may suffer as a result of warping and shrinking. Sintering may cause a reduction in volume of as much as 35 pct, and for this reason many parts are often re-pressed (coined) in a die to correct any undesired dimensional changes.

Acknowledging that powder metallurgy does offer distinct advantages if properly applied, the authors caution the prospective user of fabricated metal parts to investigate the method thoroughly, with an open mind, and not blandly accept the technique as a cure-all for his production problems. Critically evaluating the role of powder metallurgy in industry, the authors hold that a thorough airing of the facts and fallacies of powder metallurgy will accomplish much in the strengthening of this young, maturing industry.

The efficiency of coining depends again upon the part and its physical properties. Since dimensions can change after pressing or be altered by die wear it can be seen that dimensional tolerances cannot be overlooked or ignored.

Generally speaking, tolerances which can be met in general machine practice can also be met by powder metallurgy, but beyond that, closer tolerances for the most part are not commercially feasible.

(2) *How good are the physical or mechanical properties of powder metallurgy parts?* Physical or mechanical properties as indicated above depend on the powders used—their composition, particle size, particle size distribution and method of manufacture (carbonyl, electrolytic, atomized, hydrogen-reduced, milled, etc.). The latter condition influences individual particle characteristics such as shape, hardness and impurity content. In addition to the effects of the powder itself there are those which depend on pressing and sintering conditions; conditions that influence the final density and hardness of a part.

After finishing thus far, it is possible to case-harden some metal powder compacts by carburizing or nitriding, depending, of course, upon

whether the particular metal or alloy used is amenable to case-hardening. The compacts may be further worked and shaped by swaging, rolling or drawing. This method is commonly used to prepare metallic tungsten, molybdenum, cobalt, titanium, tantalum, thorium, uranium and others.

Assuming ideal physical characteristics to be those of the metal made by fusion metallurgy, it is entirely possible in some instances to achieve this ideal by powder metallurgy methods. But for the present at least this is limited to the laboratory. Only in a few cases have such parts been found commercially practical because the high pressures and sintering temperatures required are difficult to meet commercially. Special examples can be cited such as nickel-cobalt-iron-aluminum combinations produced by powder metallurgy which have physical strengths exceeding cast materials of equivalent magnetic coercive force. For bearing purposes, the anti-frictional properties of lead can be combined with the strength of steel by saturating a porous steel structure with molten lead. Copper may be used in place of lead to produce a self-brazing alloy. Also, it is possible now to electroplate metal powder parts.

Large Parts Difficult To Make

The general case consists, however, of a part made from common metal powders and given no special treatments. Such parts seldom attain the physical strengths of the part made by fusion metallurgy. Sintered compacts made from copper powder can be made with strengths equivalent to soft annealed copper and with 50 to 75 pct of the ductility, but at the expense of very high shrinkage. In addition such parts usually suffer from the inherent porosity of the metal powder compact, which affects ductility and impact strength. This plus pressing difficulties is one reason why large parts cannot be easily produced at present.

The development of "hot pressing" techniques will serve to eliminate a good part of present difficulties. For many applications, however, the benefits which may be derived from improved design, ease of mass production, lowered labor costs and scrap savings all easily compensate for any physical shortcomings of the powder metallurgy product.

(3) *What about production costs?* Here again the part itself, its size and shape and composition, will determine the cost of production. Die and tool costs, which generally are expensive, must be amortized and so must the initial investment in pressing and sintering equipment. The principal means of liquidating this preparatory investment is by mass production. A large number of identical parts would have to be made just to justify the initial die and tooling costs. Then over and above this would be the additional production necessary to cover such costs as presses, handling equipment and other capital expenditures.

The photographs showing the metal powder and fabricated parts on the preceding pages of this article were furnished by New Jersey Zinc Co., New York, and F. J. Stokes Machine Co., Philadelphia, respectively.—Ed.

To avoid these expenses many manufacturers farm out their powder metallurgy requirements to reputable fabricators on a contract basis. There are a number of such fabricators who are prepared to furnish all of the technical know-how and experience as well as plant and laboratory facilities necessary to produce a finished part made by powder metallurgy. Powder metallurgy can be an expensive process unless it results in a product which can be produced faster than by any other means or at a greater saving from scrap losses, or at a saving of manhours of labor, or in a product possessing improved physical, mechanical and design characteristics.

Powder Metallurgy Shows Signs of Maturity

As anyone who has followed the progress of powder metallurgy will readily admit, it is a rapidly growing industry. Signs of the maturity which must come with growth are indicated in one instance by a marked increase in the number of universities and other institutions of higher learning that have included courses in powder metallurgy in their regular engineering curriculum. Of the 37 such institutions in this country, which offer degrees in metallurgical engineering, 31 (84 pct) teach powder metallurgy. Immediately preceding the last war this percentage was considerably less, nearer 5 pct. In many of these educational institutions powder metallurgy is taught in conjunction with other metallurgy courses, however, several institutions offer specific courses in this subject and some are set up to train graduate powder metallurgists.

When a new industry begins to take hold, its first attempt to stand alone is usually evidenced by its recognition of the need for standardization. Methods and processes predicated on the experience of individual companies eventually begin to reflect the methods and practices of an industry. To both facilitate and hasten the shift of emphasis from individual to industry, the individuals must cooperate with each other and act jointly in the formulation of standards for their industry.

Lay Groundwork for Standardization

Such is the case with the powder metallurgy industry. In 1945, the Metal Powder Assn. formed a Granular Powders Standards Committee whose objective was to review and study all test methods pertaining to metal powders and to issue as standard methods those having general application to powder metallurgy. In the past 4 years methods have been issued on sampling, weight loss in hydrogen, flow rate, apparent density, sieve analysis and determination of insoluble matter in iron and copper powders. In two of these, flow rate and apparent density, a statistical study of the precision of the method was made and supplements issued. Companies representing all phases of the powder metallurgy industry both here and abroad participated in the committee's surveys. Having thus far laid the groundwork for standardization, the committee is now reviewing additional methods wherever sufficient interest is shown to indicate general applicability.

Another step forward for the metal powder

industry was taken when its proponents, feeling the need for statistical information distinct from other metal working industries, decided to collect, correlate and distribute statistical information through the Metal Powder Assn. Statistics as such can become an invaluable source of market development and sales information. Cooperation from the metal powder industry has advanced to the point where the association is now able to provide its members with accurate monthly statistics on the shipments of domestic iron powder and figures on imported iron powder as well as shipments of grain copper, lead, tin and solder powders. The statistics are broken down according to ultimate use such as bearings and parts, friction materials, graphite-metal brushes, magnetic cores, protective coatings and miscellaneous. Such statistical information has proved invaluable in several instances when the association has been called upon to represent the metal powder industry in matters pertaining to freight rates, military requirements, and so on.

Expand Annual Meeting Activities

Another sign of maturity is the increased interest on the part of a larger segment of the powder metallurgy industry including powder producers, fabricators and equipment manufacturers in the Metal Powder Assn., and its activities. The standards mentioned above have found very wide acceptance both here and abroad.

In 1945, the association held an industry-wide 1-day meeting for the purpose of discussing problems and developments of interest to powder metallurgists, design engineers, powder and parts salesmen and others interested in powder metallurgy. Last year the meeting, which has become an annual event, was extended to include 2 days and also incorporated exhibits of all phases of powder metallurgy by leading companies in the field. Published proceedings of these meetings have met with considerable public response.

This year, the Fifth Annual Meeting and Exhibit promises to be the biggest show yet produced, devoted entirely to powder metallurgy.

The vast design and production obstacles which may be overcome by powder metallurgy coupled with the aid of properly enlightened engineering will serve to convince even the most skeptical of the obvious merits of powder metallurgy. But only when such merits are examined through clear, untinted glasses, will powder metallurgy become no longer an art to be practiced and utilized by a few, but a science that is sure to advance and bring with it the realization of ideas which today are merely visions.

Thus powder metallurgy presents a challenge to the user of fabricated metal parts. Perhaps in powder metallurgy he can find a way to make his product faster, cheaper or better. He must not expect too much from powder metallurgy but should approach it with an open mind to see what it really can do for him.

At the same time those engaged in the metal powder industry must recognize that they are dealing with an adolescent reaching manhood. They must know that powder metallurgy will strike out for itself and that its actions cannot be dictated by a doting parent. It has learned the facts of life and must make its future as best it can on what it has been taught. Tall stories are things of the past and it will be judged on its accomplishments from now on. Powder metallurgy may and should make many friends and these friends, either directly or in many cases indirectly, will benefit those who have nurtured it.

Thorough airing of the facts and fallacies of powder metallurgy plus recognition of the fact that growth means wholesome competition resulting in greater strength will go far toward developing a strong, sound powder metallurgy industry.

Brass Powder Parts In Toys

A. C. GILBERT CO., manufacturer of "American Flyer" model trains and the well-known "Erector" sets, has found the use of pressed powder parts advantageous in several interesting applications.

One of the accessories of the American Flyer model train sets is a "Talking Station." Pressing a special button causes the "Station" to announce incoming and outgoing trains in a clear voice. Actually, inside the station house is a small automatically controlled phonograph—and the brains of the mechanism are two brass powder cams which must be corrosion resistant and possess a fair degree of conductivity at low voltages. When made of brass powders, the cams are formed in one operation and the desired tolerances are accurately held. The outside diameter has a tolerance of ± 0.005 in. while the center hole tolerance

is only ± 0.001 in. Being brass, the corrosion resistance is good and the conductivity of the finished parts is ample.

The gears which are included in Erector sets pose a neat problem. In order for them to be completely satisfactory, they must neither show excessive wear, nor should they be noisy. Brass powder gears are felt to meet these requirements. Because of their porosity, the gears can be oil-impregnated—reducing both wear and noise. Oil-impregnated gears do not have an excess of oil present and therefore will not cause staining.

Tolerances on the gears are close— ± 0.001 in. on the center hole diameter and plus nothing, minus 0.003 in. on the OD and pitch diameter. The brass powder parts maintain these tolerances satisfactorily.

Powder Metallurgy

Improved

By G. J. COMSTOCK, Professor and Director;
JOHN D. SHAW, Asst. Professor and Asst. Director;
C. L. CLARK, Research Engineer, and W. V. KNOPP, Research Engineer, Powder Metallurgy Laboratory, Stevens Institute of Technology, Hoboken, N. J.

IT appears to the authors that during the past 12 months there has been a most important widening of the scope of applied powder metallurgy. A scrutiny of the physical properties of the metal powder products which were produced previous to 1948 has generally indicated that, with a few notable exceptions, these products must be regarded as compromise materials when their physical attributes are directly compared with materials of identical composition made by fusion metallurgy. Many products of powder metallurgy cannot, of course, be made by fusion metallurgy, and consequently no direct comparison of physical properties is possible. For some time such alloys as brass and bronze have been fabricated from powders and have displayed properties similar to the same cast alloys—always providing these similar properties were required and special techniques were employed to produce them.

In the year 1948 a series of ferrous alloys was produced and fabricated by methods which are still under development. These powder alloys displayed physical properties comparable with the cast alloys after the application of revised, but still normal, heat treatments. The development of heat-treatable, dense, high-strength ferrous alloy products from metallic powders marks an advance of such magnitude that at present it cannot be accurately evaluated. Some period of time must elapse before these results can be announced in detail.

Without this new development, the commercial application of industrial powder metallurgy has seen a notable expansion in 1948. There are a number of reasons for this. Pos-

sibly the most important single factor is the current willingness of manufacturers to investigate every means that can be made available for reducing the direct labor costs involved in production. Before the war, a great many manufacturers preferred to use readily available machine tools and labor rather than a new process which presented the necessity for radical manufacturing changes, even though the new process might reduce costs. This was definitely not true after World War II and, as a result, the pressing of parts from powders as a means of eliminating machining operations has been more generally applied.

Two of the large metal powder fabricators have greatly increased their production facilities and similar increases in other plants are now under way. Thus, even without changing the nature of the products which are being made from metal powders, the facilities for producing them and the number of them produced have been increased. When the new high density, heat-treatable products have been generally added to this already increasing volume of metal powder parts, it is felt that the total volume will be sufficiently large to make this method of manufacture an important industrial manufacturing process.

The past year has been an active period for fundamental research and study in the field of powder metallurgy. Interest has been fomented in an understanding of the fundamentals of powder metallurgy, as witnessed by the enthusiasm occasioned by the papers (of a theoretical nature) presented at the recent AIME Powder Metallurgy Symposium in San Fran-

Technology Widens Application

A substantial amount of research and development work in powder metallurgy has been quietly in progress during the past year. Hot pressing of alloy powders and the application of powder metallurgy to the high temperature alloy field are two programs that have exhibited considerable promise.

cisco. This does not mean that the conventional uses of powder metallurgy in industrial applications are being neglected. The methods of production of parts in which consolidation during heat treatment is dependent upon particle to particle welding, or those in which a minor molten constituent acts as a cementing medium for the higher melting constituents, which are familiarly known as the "cold press" method, have expanded considerably during the past period due to the normal calls of industry.

While nonferrous powder production has steadily increased, it is in ferrous powder consumption that spectacular increases have been noted in the past year. The iron powders available have lent themselves readily to manipulation by the cold press technique, and since they can be obtained at a low cost and can be handled in conventional powder metallurgy equipment without any major modification, it follows that their use would be expanded. Surprisingly enough, this use did not devolve upon substitution for nonferrous powders in already well-defined applications, but rather largely in new uses in which iron powders could be competitive and nonferrous powders could not.

The fabrication of shaped pieces from alloy powders by use of the hot pressing technique (application of pressure and heat simultaneously) has been actively tested during the past period. Some applications have been made in which alloy powders have been used to replace or supplement primary powders in the formation of more or less porous bodies by already recognized powder metallurgy techniques, although preliminary experiments indicated that many of these alloy powders required high pressures to achieve normal densities in the cold press process. At the same time, it has been recognized that greater possibilities rest in the development of the hot-press technique in order to achieve densities approaching theoretical at relatively low compacting pressures.

Experiments performed on a number of steel powders have indicated that when theoretical

densities are attained under the proper conditions of consolidation, the physical properties of the materials formed by powder metallurgy are substantially equivalent to those of like composition obtained by the more familiar processes of casting and forging. Considerable thought is now being given to this method of fabrication (hot-pressing of alloy powders). Even though it is recognized that the processing steps and equipment may be radically different, the potential savings are of such an order that a considerable expenditure in research and development is justified, particularly in view of the promising indications which have been obtained to date.

It is gratifying to report the notable amount of research being done by the technical staffs of universities and companies in the field of powder metallurgy. Many projects have been initiated on the fundamental concepts of pressing, sintering and other factors peculiar to powder metallurgy. As the art was originally conceived, the results obtained by the manipulation of metallic elements in powder form were largely empirical and were affected by both the powders and techniques employed. Each organization had its *secret* processes, involving the ingredients used in the powder blend, the conditions of pressing, or the time, temperature and atmosphere used for sintering. Attempts are now being made to determine the fundamental causes for the various processing steps and to apply these fundamentals to the industrial processes with the ultimate object of producing better products at a reduced cost. It is of interest to note that the program of approach has had strong backing from governmental sources.

It is regrettable that some of the most spectacular powder metallurgy developments, applications in the field of nuclear energy and jet propulsion, must yet remain in a restricted category. Sufficient to say that the promise in this field is such that, without powder metallurgy, developments in these fields would have

been severely hampered. It is expected that the considerable governmental and private research conducted in the application of powder metallurgy to heat-resistant alloys, when published, will advance the field of powder metallurgy many-fold.

The fact that metal powder techniques have become generally well recognized as a means of manipulating "difficult" metals is demonstrated by the current work on titanium and zirconium. Considerable enthusiasm is being generated in the commercial production of these two metals which have extremely promising physical and metallurgical properties. Titanium, which heretofore has been very difficult to produce because of its sensitivity to small amounts of impurities, is now being made by the powder metallurgy technique, and the feasibility of preparing ductile titanium on a commercial basis has been demonstrated by the Bureau of Mines. Fabrication of this metal is now being done in several commercial plants, and titanium can no longer be considered in the category of a rare metal.¹ Zirconium is another metal which can be produced in ductile form by powder metallurgy in much the same

manner as titanium. Molybdenum, tungsten,

¹"Physical Properties of Titanium Alloys," THE IRON AGE, Dec. 30, 1948, p. 41; "Melting and Casting Titanium," THE IRON AGE, Jan. 13, 1949, p. 59.

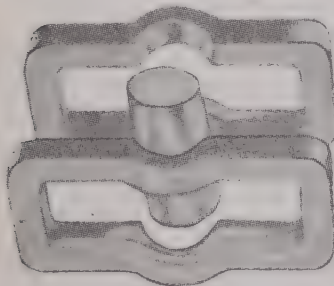
and tantalum are other so-called "rare metals" which have been prepared commercially by powder metallurgy techniques.

Consideration is now being given by the nuclear physicist to the creation of a new tool of interest to metallurgy and chemistry in the form of radioactive tracer elements. How readily can this tool be applied by and to powder metallurgy in the study of the movements taking place during sintering, diffusion, etc.?

Powder metallurgy has taken great strides forward during the past year, fomented by the effects of the recent war, by industrial production, and by the realization that there is a tool which offers many economies and advantages in use. The individuals actively associated with the field feel that so far as the industrial application of powder metallurgy is concerned, only the surface has been scratched and that the future portends many interesting and surprising developments.

TV Parts Made by Powder Metallurgy

THE use of iron powders for production of high voltage transformer cores used in television deflection circuits has permitted the



Radio Corp. of America to improve the electrical characteristics of the cores and reduce their cost of production substantially. Cores are made up of three pieces, two side frames and a solid

center slug, shown in the accompanying illustration, having a combined weight of 1 1/3 lb. Since current production by the company is averaging 5000 core assemblies a day, this application represents an important market for iron powders.

The former technique of core production used silicon steel laminations which were wound with binding resin between turns. Then the assembly was molded in position, cured, and cut in two for winding. The laminated cores were subject to eddy current losses in the laminations. Vibrations were set up by the laminations when under load, creating an undesirable high pitched note in the set. The electrical resistance of the iron powder core particles is higher, so that eddy current losses are lower. In addition, there is no need to insulate the iron powder frames.

RCA uses minus 100 mesh sponge iron pow-

der for the core frames and minus 100 mesh electrolytic iron powder for the center slug. The higher magnetic permeability of the electrolytic iron powder resulting from its lower content of impurities and greater compressibility is required for the center slug, but not for the frames.

Production sequence for frames and center slug is the same, except that the grains of the latter are insulated from one another by adding a chemical reagent. The first step is to mix the iron powder with phenol formaldehyde resin as a binder. Then the mixture is compacted in a mold at 25 tsi at room temperatures. Compacts are cured in a circulating oven at temperatures of 290° to 300°F for a period of 45 min to an hour. Mold lubricant, calcium stearate, is applied in the metal powder mix.

The molds used for compacting are very heavy, made in high chromium, high carbon tool steel with a superfinished mold surface. Automatic Kux compacting presses are used, 150-ton press for frames, 50-ton for center slug. This technique results in very strong cores with breaking strengths ranging from 1500 to 2400 lb.

RCA has been producing iron powder cores for several years at its Camden plant and sells part of its production to other manufacturers. Production cost of the laminated cores was \$3.50 each. By using Alnico permanent magnet castings for cores, the cost was reduced to \$1.25. The iron powder cores are being produced for 55¢ to 60¢ each.

Metal Powder Meeting Set for Chicago

FEATUREING a technical program of seven formal presentations and 17 exhibits representing parts fabricators, equipment manufacturers and powder producers, the fifth annual meeting and exhibit of the Metal Powder Assn. will be held at the Drake Hotel, Chicago, April 5 and 6, 1949. The meeting is open to members and nonmembers alike.

For the first time in the history of the association, election of officers will be conducted during the annual meeting. Present officers are: H. E. Hall, president of Metals Disintegrating Co., Elizabeth, N. J., president; S. K. Wellman, president of S. K. Wellman Co., Cleveland, vice-president; R. L. Ziegfeld, acting secretary; and T. L. Robinson of Wel-Met Co., Kent, Ohio, chairman of the board.



MPA President H. E. Hall, president of Metals Disintegrating Co., Elizabeth, N. J.

Technical Program for Fifth Annual Meeting and Exhibit, MPA, to be held April 5 and 6, 1949, at the Drake Hotel, Chicago.

TUESDAY, APRIL 5

- 9.00 A. M.—Standards Committee Meeting—Place to be posted.
- 9.00 A. M.—Registration—French Room Foyer.
- 10.30 A. M.—Informal Open Discussion of Powder Metallurgy—Grand Ballroom. Discussion Leaders—T. L. Robinson and P. E. Weingart.
- 12.00 noon—Luncheon for Members followed by Annual Business Meeting of Metal Powder Assn.—Parlor G.
- 2.00 P. M.—Welcome by President H. E. Hall and Introduction of Program Chairman P. E. Weingart—Grand Ballroom.
- 2.15 P. M.—Some Effects of Oxygen on the Performance of Iron Powder—J. J. Cordiano, Buel Metals Co.
- 3.00 P. M.—Tolerances of Finished Metal Powder Parts—W. R. Toeplitz, vice-president, Bound Brook Oil-Less Bearing Co.
- 3.45 P. M.—Hygiene in the Metal Powder Industry—D. R. Johns, M.D., medical consultant for the Metals Refining Co., and others.

- 4.30 P. M.—Selling Parts Made from Metal Powders—Morris Boorky, president, Presmet Corp.
- 5.30 P. M.—Reception—Grand Ballroom.

WEDNESDAY, APRIL 6

- 9.00 A. M.—Registration—French Room Foyer.
- 10.00 A. M.—Effects of Impurities in Metal Powders—F. V. Lenel, Rensselaer Polytechnic Institute.
- 10.45 A. M.—Powder Metallurgy From the Design Engineer's Viewpoint—J. L. Bonanno, Chief Engineer, Lionel Corp.
- 11.30 A. M.—Characteristics of Materials Involved in the Magnetic Fluid Clutch—H. D. Saunderson, National Bureau of Standards.
- 12.30 P. M.—Luncheon—Gold Coast Room, Guest Speaker Joseph Zimmerman, Editor-in-Chief, *Daily Metal Reporter*
- 2.30 P. M.—Board of Directors Meeting—Place to be posted.

Metal Powder Show Exhibitors; Walton Room, Drake Hotel. Exhibits open 10:00 a.m. to 7:00 p.m. Tuesday, April 5, and 9:00 a.m. to 3:00 p.m. Wednesday, April 6.

American Instrument Co., Inc., Silver Spring, Md., will set up a Roller particle size analyzer.—Booth No. 10.

American Metal Co., New York, will display metal powders, showing applicability to the manufacture of parts.—Booth No. 13.

Antara Products Div., General Aniline and Film Corp., New York, will display grades of carbonyl iron powder and photomicrographs.—Booth No. 16.

Electric Furnace Co., Salem, Ohio, will illustrate furnaces used for sintering and other powder metallurgy processes.—Booth No. 3.

Federal-Magpul Corp., Detroit, will display specially engineered powder metallurgy products, including copper-lead, steel-back bearings.—Booth No. 18.

General Machine Co. of New Jersey, Newark, will show models of the double cone blenders and the valves for handling solids.—Booth No. 14.

Charles Hardy, Inc., New York, will display iron, copper-iron, steel, stainless steel and Hardyne magnetic powders, and fabricated parts.—Booth No. 17.

Kux Machine Co., Chicago, will have a powder press in operation forming small gears. Metal powder parts will also be shown.—Booth No. 20.

Metals Disintegrating Co., Elizabeth, N. J., will present a panorama of nonferrous metal powder products. Alloy powders will also be exhibited.—Booth No. 6.

Metals Refining Co., Hammond, Ind., will display various metal powders illustrating engineering control practices.—Booth No. 19.

National Bureau of Standards, Washington, will have operating models to demonstrate the principles of the magnetic fluid clutch.—Booth No. 11.

New Jersey Zinc Co., New York, will feature nonferrous powders and parts such as filters, mechanical

parts and ornamental applications.—Booth No. 4.

Plastic Metals Div., National Radiator Co., Johnstown, Pa., will display iron, nickel and other metal powders and a variety of parts.—Booths Nos. 1 and 2.

Powdered Metal Products Corp. of America, Franklin Park, Ill., will show display charts illustrating their products. Live-action exhibits will demonstrate the application of some of these parts.—Booth No. 15.

F. J. Stokes Machine Co., Philadelphia, will feature pressing equipment. Actual parts and typical production data will be shown.—Booth No. 9.

S. K. Wellman Co., Cleveland, will display clutch plates, fringes, brake shoes and linings made from metal powders.—Booth No. 7.

Wel-Met Co., Kent, Ohio, will show metal powder parts, including combinations of metal powders such as leaded iron bearings.—Booth No. 5.

How Ford Produces Parts

By E. E. ENSIGN

*Supervisor, Nonferrous Metals Research,
Ford Motor Co.,
Dearborn, Mich.*



TYPICAL bushings produced for use in Ford cars from bronze and iron powders that are compacted, sintered and coined. The external groove in bushing at top left is cut in a lathe.

THE utility of certain parts made by sintering metal powder compacts has offered such promise that a sizable and rapidly growing department for the production of such parts is now an important adjunct of the Ford Motor Co. River Rouge Plant. Most of the parts now in production are bushings, of which more than a million a month are turned out, but a long list of other parts are scheduled for manufacture as facilities are expanded.

At present, all parts are made either to SAE Type I Class A or SAE Type II Class B specifications, the former containing 9.5 to 10.5 pct Sn, remainder copper (except for 0.5 pct max allowable impurities) and the latter 9.0 to 11.0 pct Cu, remainder Fe (except for 3.0 pct max allowable impurities). Densities of 6.3 to 7.2 g per cc and oil contents of 15 to 25 pct are specified for the bronze and densities of 5.3 to 6.5 g per cc and oil contents of 19 to 27 pct for the iron product.

Production starts with weighing the powders, which include 1.0 pct graphite and 0.3 pct stearate, employed primarily as die lubricants. In bronze, the copper powder is of 99.5 pct min purity, 2.48 to 2.52 apparent density and has a flow time of 0.58 to 0.62 min for 50 g. Screen analysis is as follows: On 100-mesh screen, 0 to 0.2 pct; through 100 and on 150-mesh, 3 to 10 pct; through 150 and on 200-mesh, 15 to 22 pct; through 200 and on 250-mesh, 3.5 to 5 pct; through 250 and on 325-mesh, 30 to 35 pct; through 325, 30 to 40 pct.

Powders weighed out are put through a Sprout-Waldron mixer having three stages; a

ribbon mixer, a 100-mesh screen and a second ribbon mixer. Many other types of mixers were tried before this combination was found to yield the stable mixes desired. Drums of the powder mixes are delivered to the compacting machines.

One 40-ton, three 20-ton, and three 30-ton presses are used for compacting. Each machine has its own hopper and automatic powder feed and adjacent to each die there is an exhaust opening connected to a dust collector. Powder is fed through an oscillating shoe that wipes across the die table and the top face of the die, whose recess is filled by gravity feed and, when filled, is wiped flush by the shoe so that a fixed volume is fed in each cycle.

Feeding is done, on thick-walled parts after the core pin is elevated flush with the top of the die, only the annulus being filled. After the shoe clears the die, the hollow upper punch is forced down and the hollow lower punch is forced upward, completing the compact. As the upper punch is retracted, the lower punch is moved further upward to push the compact off the core pin and out of the die cavity. Then the shoe is advanced and pushes the compact into a perforated chute, fig. 1. Excess powder pushed into the chute falls through the perforations into a solid chute below and thence into a covered can for collection and reuse.

Motion of the shoe as well as of the punches and of the core rod (when the latter is not fixed) is controlled by cams on all machines, the timing and strokes being precisely set for repetitive action in each cycle. Although the number of

From Metal Powders

Powder metallurgy plays an important role at Ford Motor Co., with more than a million bushings being produced per month. The processing method employed for producing these parts is discussed in this article, including a description of the automatic restriking operation. Automatic machining of external grooves in certain types of bushings is also discussed.

cycles and of compacts per minute can be varied (using Reeves drives) up to 30 per min, the usual rate averages about 14.

Setups are made with great care and are checked periodically to insure holding specified weight and length limits, since these factors influence the density of the compact. Lengths are commonly held within ± 0.005 in. and weights within ± 0.1 g. During current production, one operator per machine is used, but since the machines run automatically, it is expected that one operator to each two or three machines will be feasible as more experience in production is acquired.

Each operator sets parts on end in metal trays so that no part is in contact with any other. After trays are filled they are transferred to one of the three sintering furnaces.

All three sintering furnaces are electrically heated and are supplied with cracked propane gas from generators. Combustion occurs outside the furnaces and all are provided with fire curtains at both ends. Fig. 2 shows the discharge end of one furnace which has an 8-ft hearth and a 24-ft cooling zone. All furnaces perform the same work and all have continuously moving woven wire belts to advance trays of compacts through the tunnels.

Gas for the controlled atmosphere contains 2.4 pct CO_2 , 20.4 pct CO , 21 pct H_2 and remainder N_2 . This gas is cooled before entering a sintering furnace and provides a reducing atmosphere. Gas escaping from a furnace is burned at the fire curtains. The same atmosphere is used for both bronze and iron compacts. Rates of feed are varied to suit the parts going through the furnaces and are so set that the growth of compacts is about 0.001 in. per in. Maximum temperature is held constant within $\pm 5^\circ\text{F}$.

In the furnace, bronze parts attain a temperature of 1440° to 1460°F , and iron parts reach 2040° to 2060°F . Cooling zones also employ controlled atmospheres and are so designed and set that sintered parts issue from the furnaces at

about 125°F . Trays are removed by hand after they issue, but storage tables (at conveyer height) are being added so that an operator will not be continuously required for unloading.

Although sintered compacts are held quite close

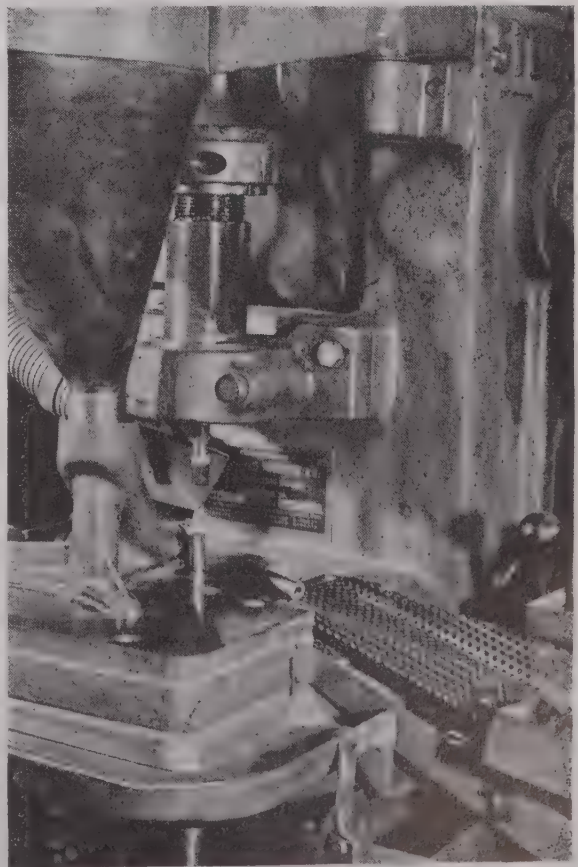


FIG. 1—Closeup of the bed and adjacent parts of a compacting machine. A bushing just compacted is being ejected from the die and will be pushed by the oscillating shoe into the perforated chute at right. Excess powder pushed into the perforated chute falls into the solid chute below it and is collected for reuse. Exhaust hose, shown at left, draws dust to a collector.

to specified size, all are restruck (coined) after sintering, as this operation insures closer dimensional limits and somewhat smoother surfaces. Coining is a rapid operation especially when a hopper-fed dial arrangement is employed, as it is in Ford production.

In fig. 3 is shown most of the row of 75-ton Cleveland restrike presses, each of which is equipped with a rocking blade type of hopper, illustrated close-up in fig. 4. Each blade has a top groove (A) which picks up the bushings and provides them with a means of sliding into a slotted tube (B). In normal operation, the dial and press bed are enclosed by screens.

Dials are indexed positively and are precisely positioned, before each working stroke of the press, by a reciprocating key that is advanced

bushing inside the dial recess and it is carried around nearly half a dial revolution until it arrives above the ejection station where it drops through a chute into a tote box. At the next indexing, the empty dial hole comes under the feed tube (fig. 4) and a sintered compact drops into it.

Since high pressures are required for coining and dies must have close clearances, it is essential that indexing be precise and that the part coined be positively ejected from the dies before another part is fed into coining position. The dial arrangement described meets this requirement and is so designed that the press stops automatically if proper indexing does not occur. Nevertheless, production is rapid, as about 40 bushings are coined per minute.

Although the coining presses are set up to



FIG. 2—Tray of parts issuing from a sintering furnace with cooling tunnel at near end. A table will shortly be added to take trays from the belt so that each tray will not have to be lifted off separately.

into successive slots in the edge of the dial. This key locks the dial just prior to and during the working stroke of the press and insures having the bushing axes directly in line with punches, two of which are used, one from above and one from below the bushing, as shown in fig. 5.

The upper punch includes a core-rod which is elevated and enters the hole in the sintered powder compact before the part enters the die. After these are in position, the hollow upper punch descends until the face at the top of its bore is in contact with the upper end of the compact and compresses it between the two punches. As the compact is confined on all sides, it is compressed and forced to fit both the core pin and the bore of the die.

Immediately after this coining operation, which takes place at the dial station directly opposite that at which the dial is fed, the lower punch ejects the part from the die and the upper punch pushes the sintered bushing off the core rod as the latter is withdrawn. This leaves the

operate automatically, one operator per press is provided, but it is believed that as experience is gained a single operator will be able to tend more than one press. Coining completes the mechanical operations on most sintered parts, but some require a small amount of machining, such as the cutting of an external groove, and most bushings are tumbled prior to restriking to remove slight burrs that occur at ends.

Tumbling is done dry in inclined open metal barrels without adding anything to the load. In tumbling, impact of part on part removes the burrs but also results in slightly marked external surfaces. These slight indentations are visible but have not been found detrimental in Ford applications.

An Economy speed lathe, equipped with hopper feed and an automatic pickoff attachment that does the loading, has been found quite satisfactory for cutting external grooves in bushings, when so specified. A setup for such a lathe appears in fig. 6 but shows only the lower end of

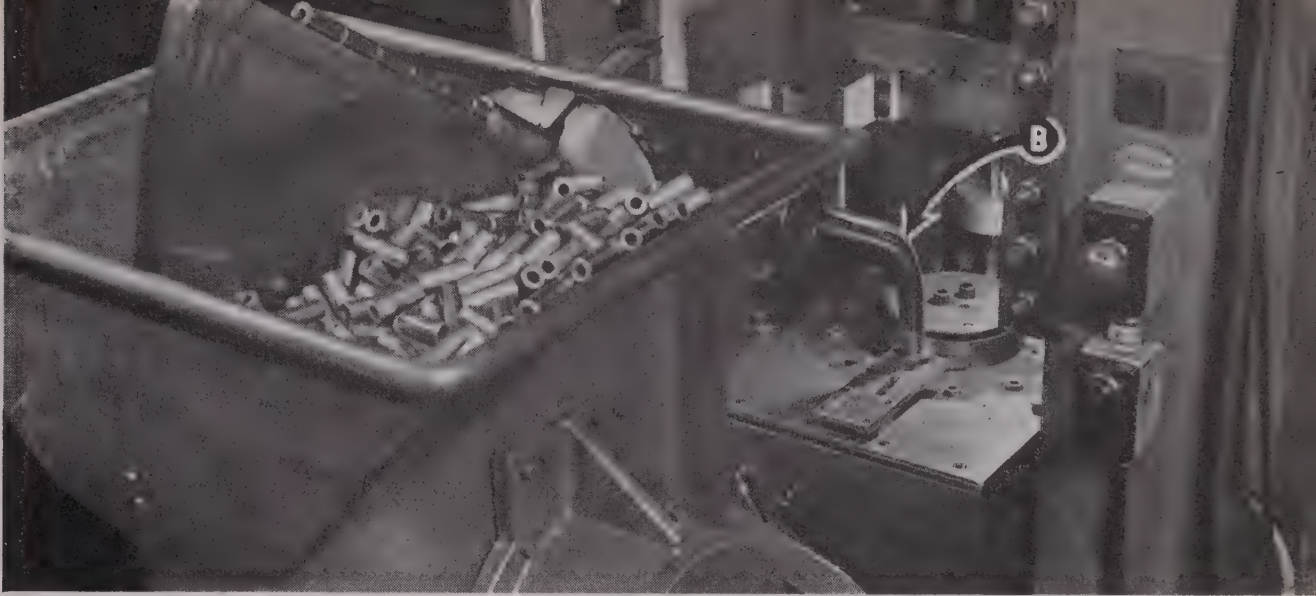


FIG. 4—Closeup of hopper equipped with an oscillating blade that picks up bushings in the grooved upper edge (A) and delivers them to a tube (B) down which they feed to the dial on the press bed. This dial on the bed of a restrike press feeds counter-clockwise. Sintered bushings slide down curved pipe to the loading station, are carried 180° to the coining station and drop out at the station just preceding that for loading.

the hopper-fed magazine that supplies bushings to the pickoff attachment. This lathe operates automatically and makes the grooving cuts at the rate of 30 per min.

Bushings slide down the inclined magazine (A) to the rocking pickoff position and are transferred automatically by the pickoff (B) to a position in line with the continuously rotating collet (D), as soon as the prior piece has been ejected. A ram (C) is advanced to push the bushing into the collet, and the tool holder (E), carrying a carbide bit, is rocked about a pivot and the bit makes its cut. When the latter is completed and the tool is rocked free, the collet opens automatically and an ejector inside the spindle pushes the grooved bushing out of the collet whence the bushing slides down a chute into a tote box. The operator need only keep the hopper loaded and watch the machine to see that it performs as required.

Before bushings are ready for delivery to assembly departments, impregnating with oil is done in small autoclaves. These are supplied with SAE 20 machine oil into which perforated baskets of bushings are set so that oil covers the bushings. Resistance units in the bottom of the bath heat the oil to 100°F and hold it at that temperature during impregnation. When autoclaves are charged and covers are closed, a vacuum is applied and exhausts air from the pores of the bushings so that the pores become filled with the oil.

After the vacuum is shut off and air is admitted to restore atmospheric pressure in the autoclaves, the covers are opened and baskets are

FIG. 3—Row of restrike presses each of which is provided with a hopper that feeds sintered bushings to a rotating dial on the press bed.



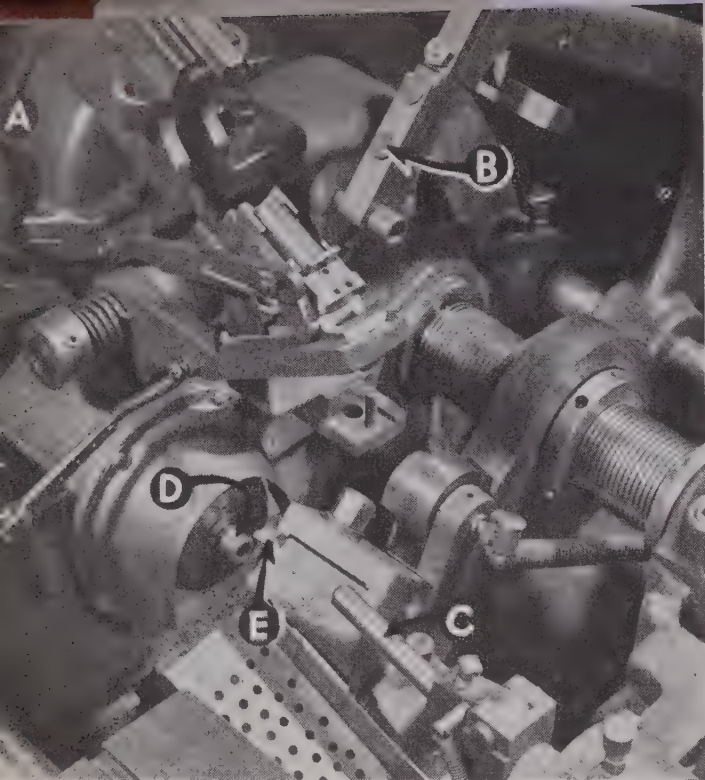


FIG. 6—Automatic lathe for cutting circumferential groove in OD of certain bushings. Magazine (A), feeds to pickoff (B) which transfers the bushings in line with collet (D) into which plunger (C) pushes the bushing. Tool holder (E) is rocked upward and its carbide cutter machines the groove. The bushing is then ejected into the perforated chute.

removed and set on trays until excess oil drains off. This leaves the bushings ready for assembly into mating parts.

Although output is confined principally to bushings, it will shortly be expanded to include numerous other parts, probably including some in brass, among these being some parts for Ford

tractor applications as well as for car and truck parts. It is also expected that valve seat inserts containing nickel, molybdenum, tungsten, graphite and iron will be produced shortly.

Large quantities of oil pump gears have been produced as sintered iron powder compacts with straight teeth but a change in specification to gears with helical teeth in new Ford cars has resulted in temporarily dropping, except for replacement purposes, the production of oil pump gears. It is expected, however, that blanks without teeth will be produced from iron powder and will show some economy over blanks cut from bar steel, the teeth being cut in both cases. Similar blanks have been produced from iron powders for other helical spur gears.

One part produced experimentally from iron powder is an eight-sided ignition distributor cam. As there is practically no machine work on these cams and they have shown excellent performance, mass production probably will be undertaken soon. Oil pump covers measuring about $2\frac{1}{4}$ in. in diam, $\frac{1}{4}$ in. thick and having two straight edges and four drilled holes, formerly were produced as gray iron castings machined on faces. These were converted to sintered iron parts having holes cored and needing no machining, at a considerable saving, but it was found that a flat blanked and pierced steel plate would cost still less, hence the stamped product has been substituted.

These and other instances show that parts produced from metal powders often compete successfully with equivalent parts fabricated by other means. In other cases, the compacted and sintered part may cost more and so be less economical. The balance in favor of or against may shift with variations in requirements, in material cost, in labor, in tooling and in machine work needed. Only a careful and continuous analysis of all factors involved can tell, as a rule, which type of part is most economical and meets other requirements with full satisfaction.

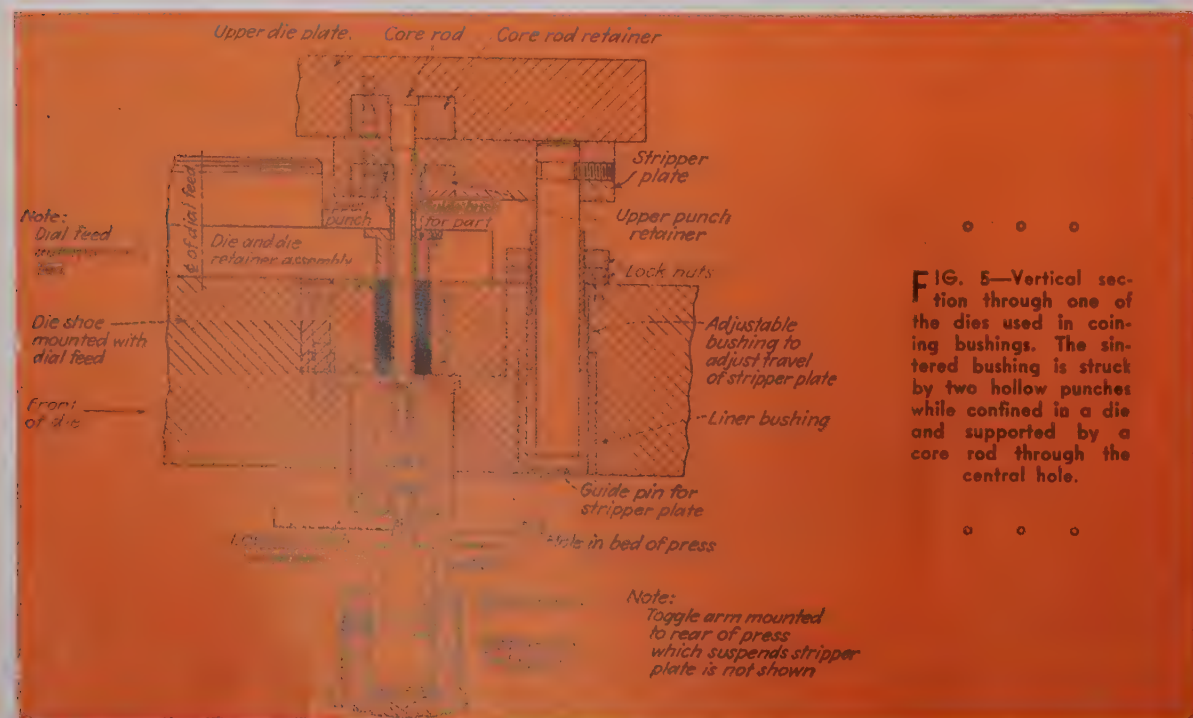


FIG. 5—Vertical section through one of the dies used in coining bushings. The sintered bushing is struck by two hollow punches while confined in a die and supported by a core rod through the central hole.

Physical Properties of Reduced Iron Powder Plus Graphite and Copper

Copper added to powder metal steel reacts in a manner similar to the reaction of copper added to cast steel—increasing strength and lowering ductility. The author describes herein an investigation where mixtures of a commercial grade of reduced iron plus 0.40 to 1.05 pct graphite and 2 and 5 pct copper were prepared, treated by means of a cycle considered commercially feasible, subjected to various standard steel heat treatments and then studied for physical properties and microstructure.

By GEORGE STERN

*Director of Research,
American Electro Metal Corp.,
Yonkers, N. Y.*

WHILE the yield and tensile properties of reduced and electrolytic irons to which graphite is added are similar for similar final carbon contents, these same properties are considerably improved by the addition of up to 5 pct Cu to reduced iron plus graphite. This improvement is especially marked after oil or water-quenching and tempering at 600° to 800°F. The precipitation hardening brought about by these heat treatments is additive to the regular steel hardening effect. Preliminary experiments have shown that a similar improvement in properties can be achieved by the addition of up to 5 pct Cu to electrolytic iron plus graphite.

In a previous paper,¹ the author reported findings on the physical properties of sintered steel made from electrolytic and reduced powders, both admixed with various percentages of graphite. The compacts were formed from mixtures containing 0.40, 0.65, 0.85 and 1.05 pct by weight of graphite by pressing at 50 tons per sq in., presintering at 2000°F for 15 min, re-pressing at 50 tons per sq in., and re-sintering at 2000°F for 1 hr. The atmosphere used was cracked propane and the cycle outlined was selected since it was felt that the pressures and temperatures were commercially feasible. The first sintering for 15 min per-

mitted the carbon to react with oxygen in the compact without allowing complete diffusion of the carbon into the iron. This rendered the material more susceptible to plastic deformation in the re-pressing operation, whereas if complete diffusion were permitted, the steel formed would resist this plastic deformation.

The compacts thus prepared from electrolytic iron plus graphite were submitted to various heat treatments and their properties compared with SAE plain carbon steels. It was found that the sintered steels had yield strengths and tensile strengths fairly close to the SAE plain carbon steels, but that their elongation, reduction in area and impact strength were considerably lower. The physical properties (mainly elongation and reduction in area) of compacts made from reduced iron plus graphite were found to be below those of mixtures of electrolytic iron and graphite, similarly treated, when compared on the basis of final carbon content. This was explained on the basis of density values and microstructures.

This article represents an attempt to improve the physical properties of steels made from reduced powder plus graphite by the addition of up to 5 pct of copper powder. A commercial grade of reduced iron powder and a commercial grade of electrolytic copper powder, possessing

TABLE I
Properties of Iron and Copper Powders Used in Mixtures Up to 5 Pct Cu.

Reduced Iron Powder		Electrolytic Copper Powder	
Carbon—0.24 Pct H ₂ loss—1.29 Pct Apparent density—1.99 G per cc Flow—33.1 sec per 50 g		Copper content—99.50 Pct Apparent density—2.55 G per cc	
Screen analysis	Percent	Screen analysis	Percent
+100	1.5	+100	0.2
+140	20.5	+150	6.0
+200	26.0	+200	17.5
+230	6.0	+250	3.0
+250	16.0	+325	25.5
+325	30.0	+325	47.8
Total	100.0	Total	100.0

the properties shown in table I, were employed. The graphite powder was a natural crystalline type having an average particle size of —325 mesh and a graphitic carbon content of 95 to 96 pct.

All mixtures studied were prepared by weighing out the amounts of powder required and tumbling for 1 hr. No lubricant was added to the powder mixture, since the die walls were painted with a solution of Sterotex in acetone.

All compacts were sintered in a push type furnace having a D-shaped Inconel muffle. The sintering was performed in an atmosphere of cracked ammonia, since cracked propane did not yield as good results when copper was present. In studying mixtures consisting of 0.85 pct graphite, 1, 2, and 5 pct Cu, and the balance reduced iron powder of the type described, it was noted that pronounced differences in density resulted, depending on whether the first sintering was performed by placing the compacts directly in the hot zone at 2000°F, or by slowly bringing the compacts up to 2000°F and holding for the required time.

Table II shows the effect on density of compacts pushed immediately to the hot zone and compacts slowly pushed to the hot zone (heated to 2000°F gradually, in about 30 min) and held for 1 hr.

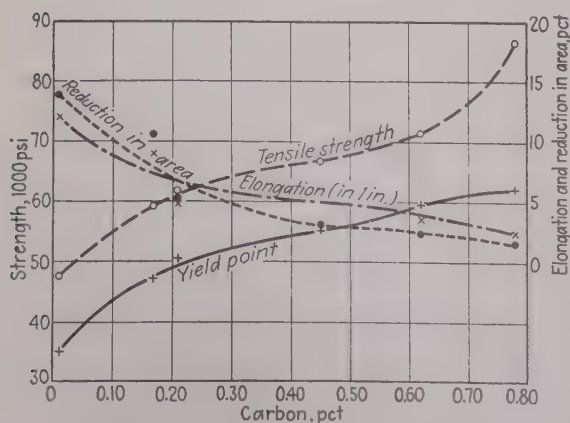


FIG. 1—Physical properties v. carbon content of reduced iron plus graphite plus 2 pct Cu. Samples tested as furnace cooled, after pressing, sintering, re-pressing and resintering.

From Table II it can be seen that slow heating of copper-containing mixtures is necessary to avoid sudden melting of the copper and attendant gassing with lowered densities resulting. The sharp increase in densities noted for the slow push to the hot zone cannot be explained by increased time at temperature alone, and therefore all compacts prepared for this study were slowly pushed to the hot zone during the first sintering.

The cycle used consisted of the following steps: (1) press at 50 tons per sq in., (2) pre-sinter at 2000°F for 15 min, (3) re-press at 50 tons per sq in., and (4) resinter at 2000°F for 1 hr.

Bars were prepared by the outlined cycle containing 2 and 5 pct Cu and 0, 0.40, 0.65, 0.85 and 1.05 pct graphite. All samples were pressed in a floating double-action die 3 x ½ in., and a standard 3 x 0.250 in. diam test bar with 1 in. gage length was machined from each compact after heat treatment for tensile testing.

Four types of heat treatments were performed on these bars (3 x ½ x ½ in.):

- (1) Samples were tested as furnace-cooled* after pressing, presintering, re-pressing and resintering.
- (2) Samples were oil quenched from 1525° to

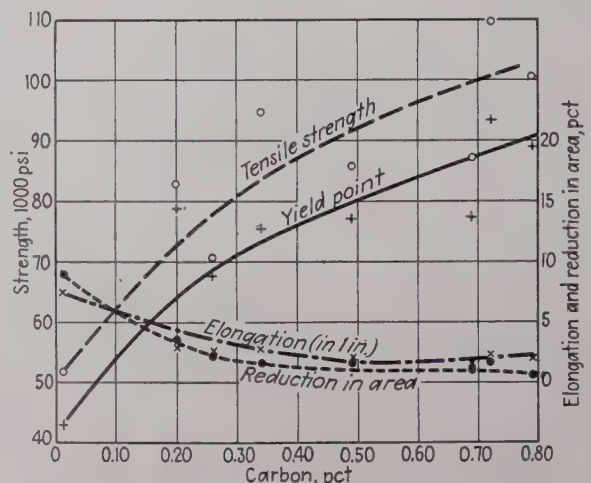


FIG. 2—Physical properties v. carbon content of reduced iron plus graphite plus 5 pct Cu. Samples tested as furnace cooled, after pressing, sintering, re-pressing and resintering.

1575°F and drawn at 600° to 800°F, depending on the carbon content of the sample.

- (3) Samples were oil quenched from 1525° to

* George Stern, "A Study of the Physical Properties and Microstructure of Sintered Steel," AIME Technical Paper No. 2045, August, 1946.

*The boat containing the charge is pushed from the hot zone at 2000° F to a nonheated part of the muffle at room temperature. The rate of cooling is actually faster than a true furnace cool.

1575°F, depending on the carbon content, and drawn at 1300°F.

TABLE II

Densities of Mixtures Containing 0.85 Pct Graphite Plus 1, 2 and 5 Pct Cu; All Compacts Pressed at 50 tsi and Sintered at 2000°F for 1 Hr.

Mixture	Final Density, G per cc	
	Pushed Straight to Hot Zone	Slowly Pushed to Hot Zone (30 min)
0.85 Pct graphite + 1 Pct Cu	6.71	7.04
0.85 Pct graphite + 2 Pct Cu	6.68	6.94
0.85 Pct graphite + 5 Pct Cu	6.86	7.17

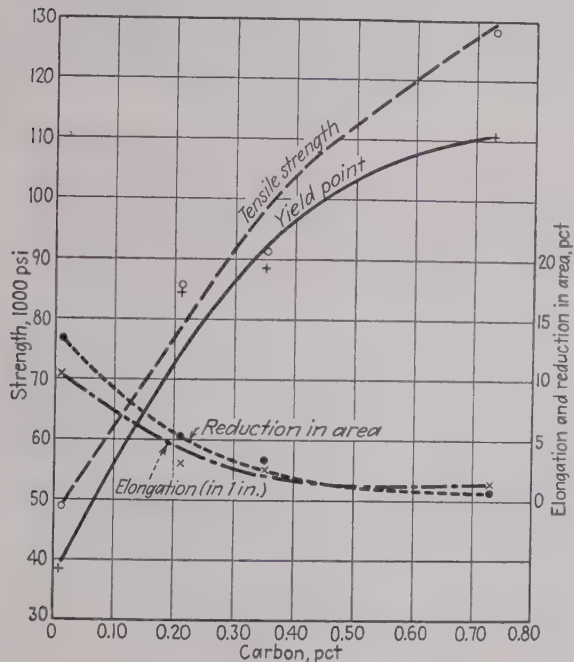


FIG. 3—Physical properties v. carbon content of reduced iron plus graphite plus 5 pct Cu. Samples pressed, sintered, re-pressed and resintered, furnace cooled, oil quenched from 1525° to 1575°F and drawn at 600° to 800°F.

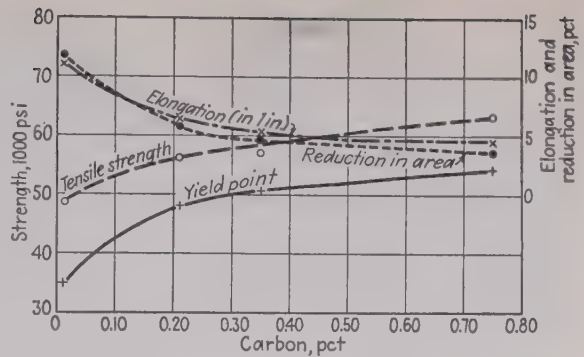


FIG. 4—Physical properties v. carbon content of reduced iron plus graphite plus 5 pct Cu. Samples pressed, sintered, re-pressed and resintered, furnace cooled, oil quenched from 1525° to 1575°F, and drawn at 1300°F.

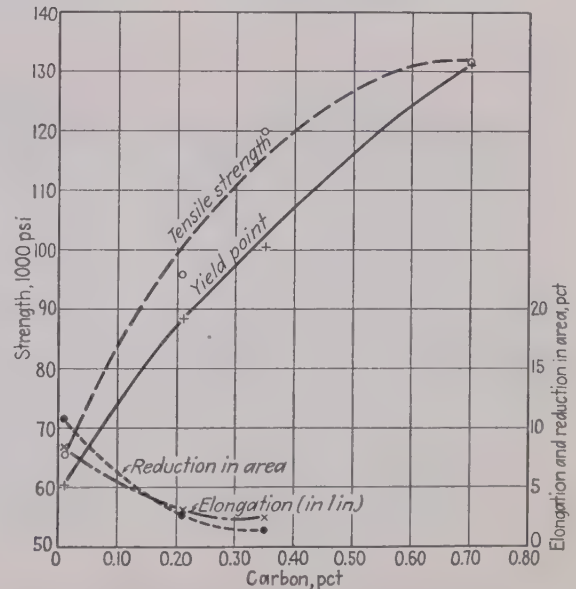


FIG. 5—Physical properties v. carbon content of reduced iron plus graphite plus 5 pct Cu. Samples pressed, sintered, re-pressed and resintered, furnace cooled, water quenched from 1525°F; drawn at 600°F.

TABLE III

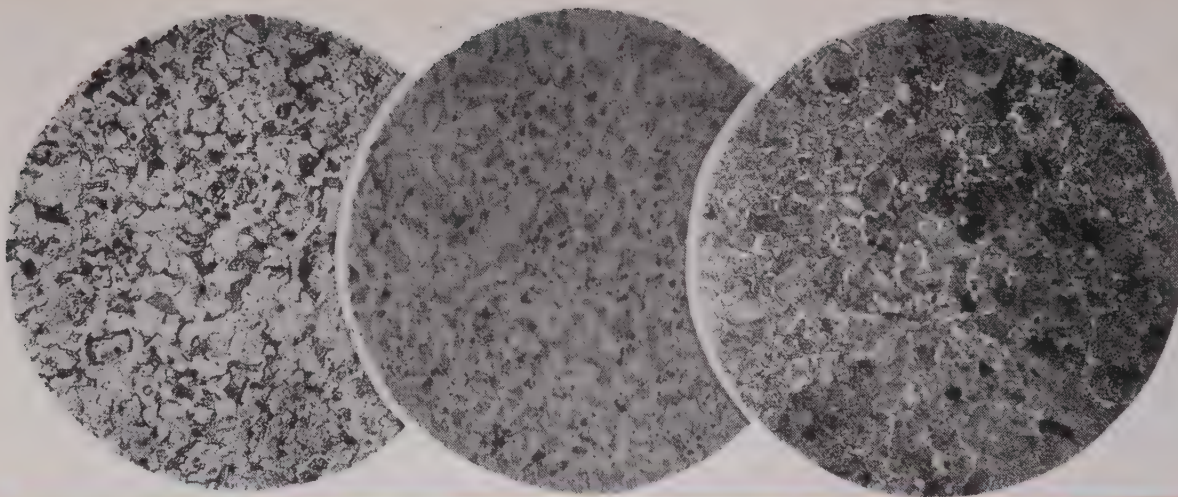
Comparison of Physical Properties of SAE¹ and Sintered Steels

Treatment	0.20 Pct C			0.40 Pct C			0.60 Pct C			0.80 Pct C		
	SAE 1020	Sin. El. ²	Sin. Red. + 5% Cu ³	SAE 1020	Sin. El. ²	Sin. Red. + 5% Cu ³	SAE 1020	Sin. El. ²	Sin. Red. + 5% Cu ³	SAE 1020	Sin. El. ²	Sin. Red. + 5% Cu ³
Furnace cooled												
Y.P., 1000 Psi	43	37	64	52	40	76	59	42	83	62	57	90
T.S., 1000 Psi	66	55	72	88	61	87	95	69	96	102	79	103
El., Pct.	35	25	45	29	21	2	24	13.5	1.5	20	7.5	2
Red. Area, Pct.	55	27	3	60	22	1.3	51	12.5	1	48	5.5	1
Oil-quenched and drawn at 1300°F												
Y.P., 1000 Psi	38	35	48	55	39	51	72	44	53	80	50	55
T.S., 1000 Psi	60	52	56	82	55	69	98	63	62	100	69	65
El., Pct.	35	35	6.5	30	30	5	26	18.5	4.5	23	10.5	5
Red. Area, Pct.	65	40	6	60	35	4.5	61	22	4	56	10.5	3.5
Oil-quenched and drawn at 800°F												
Y.P., 1000 Psi	57	50	72	76	55	97	105	65	108	125	80	112
T.S., 1000 Psi	77	65	77	110	78	104	144	91	120	175	108	134
El., Pct.	30	25	6.5	19	18	1.5	17	13.5	1.5	12	8	1.5
Red. Area, Pct.	58	25	4.5	48	19	2	48	12	1	40	6.5	1.0
Water-quenched and drawn at 600°F												
Y.P., 1000 Psi	80	80	88	95	82	107	110	124	138	140	129	138
T.S., 1000 Psi	98	75	99	125	102	120	133	131	145	200	148	145
El., Pct.	15	15	3	11	10.5	1.5	7.5	...	...	12	5	...
Red. Area, Pct.	45	23	3	42	14.5	1.5	8	...	...	33	4	...

¹ SAE values from "Alloys of Iron and Carbon," Vol. II, by Sisco, and from "Metals and Alloys Data Book" by Hoyt.

² Sintered steel El. values for electrolytic iron + graphite.

³ Red. + 5% Cu values for reduced iron + graphite + 5% Cu.



A

B

C

FIG. 6—Mixtures containing graphite plus 5 pct Cu. As furnace cooled from sintering temperature: (A) 0.40 pct graphite, final C = 0.20 pct — etch nital; (B) 0.65 pct graphite, final C = 0.34 pct. — etch picral; (C) 1.05 pct graphite, final C = 0.72 pct — etch picral. 200X.

(4) Samples were water quenched from 1525°F and drawn at 600°F.

The yield point, tensile strength, elongation in 1 in. and reduction in area are plotted v. carbon content for 2 pct Cu additions in fig. 1, and for 5 pct Cu additions in figs. 2, 3, 4, and 5 for various heat treatments. Values were taken from figs. 2, 3, 4 and 5 for 0.20, 0.40, 0.60 and 0.80 pct C contents, and these values are compared with data for SAE 1020, 1040, 1060 and 1080 steels, as well as sintered steels prepared from electrolytic iron plus graphite compacts¹ in table III.

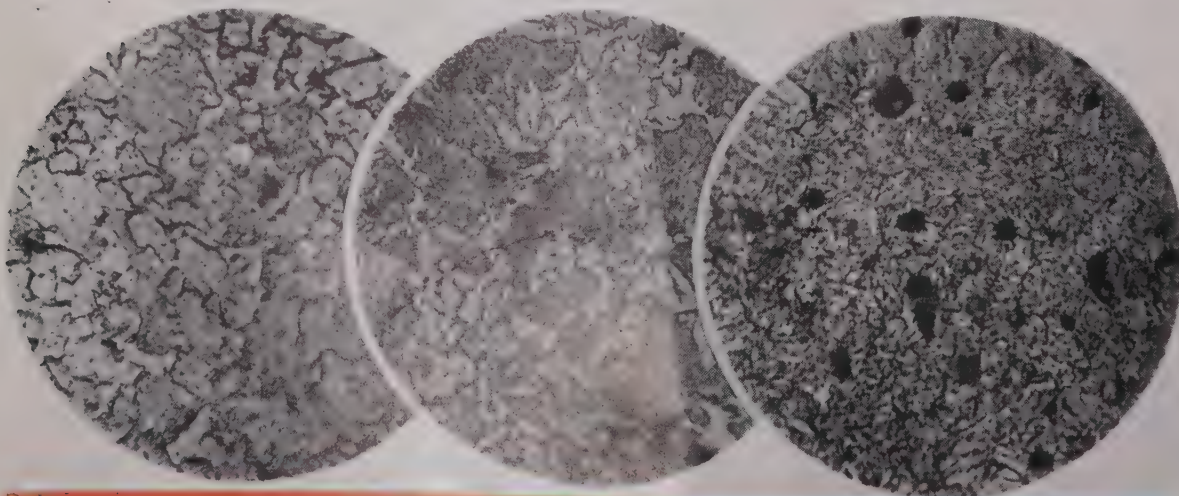
In table IV a comparison is made of properties of compacts as furnace-cooled, made by the previously outlined procedure from mixtures of reduced powder plus graphite, electro-

lytic powder plus graphite, and reduced powder plus graphite plus 1, 2, and 5 pct Cu. All bars are compared for the same final carbon content.

From tables III and IV and figs. 1 through 5, the following conclusions can be drawn:

(1) The addition of up to 5 pct Cu to reduced iron plus graphite has resulted in yield and tensile strengths much higher than those obtained in mixtures made from either reduced or electrolytic iron with graphite alone when compared on the basis of final carbon content.

(2) Without copper present, steels made from reduced or electrolytic iron powder plus graphite have approximately the same yield and tensile strengths, but the elongation and reduction in area values are markedly superior for the electrolytic iron steels. This can be ex-



A

C

FIG. 7—Mixtures containing graphite plus 5 pct Cu. As reheated to 1525° to 1575°F, oil quenched, drawn at 600° to 800°F: (A) 0.40 pct graphite, final C = 0.20 pct — etch nital; (B) 0.65 pct graphite, final C = 0.35 pct — etch picral; (C) 1.05 pct graphite, final C = 0.73 pct — etch picral. 1000X.

plained by the lower density of the reduced iron plus graphite steels.

(3) The addition of copper to reduced iron plus graphite in amounts exceeding 1 pct lowers the elongation and reduction in area values. This and the previous effect are in general agreement with the findings on the addition of copper to cast steel.

(4) The steels made from reduced powder plus graphite plus 5 pct Cu have yield and tensile strengths comparable with the SAE plain carbon steels in the same carbon range for the heat treatment consisting of either oil or water quenching from 1525° to 1575°F and drawing at either 600° or 800°F. These same heat treatments have not resulted in as close an

approach to SAE steel properties in the case of electrolytic iron plus graphite alone, despite the superior densities of these compacts. The superiority of the reduced powder plus graphite plus 5 pct copper steel is due to the precipitation hardening of the copper in the iron phase brought about by the quenching and reheating at 600° to 800°F for 1 hr. This precipitation hardening effect is additive to the regular steel hardening effect (transformation of austenite to martensite and subsequent tempering of the martensite).

Some typical microstructures for the 5 pct Cu mixtures are shown in figs. 6, 7 and 8; as furnace-cooled (fig. 6), the structures reveal increasing amounts of pearlite with increasing

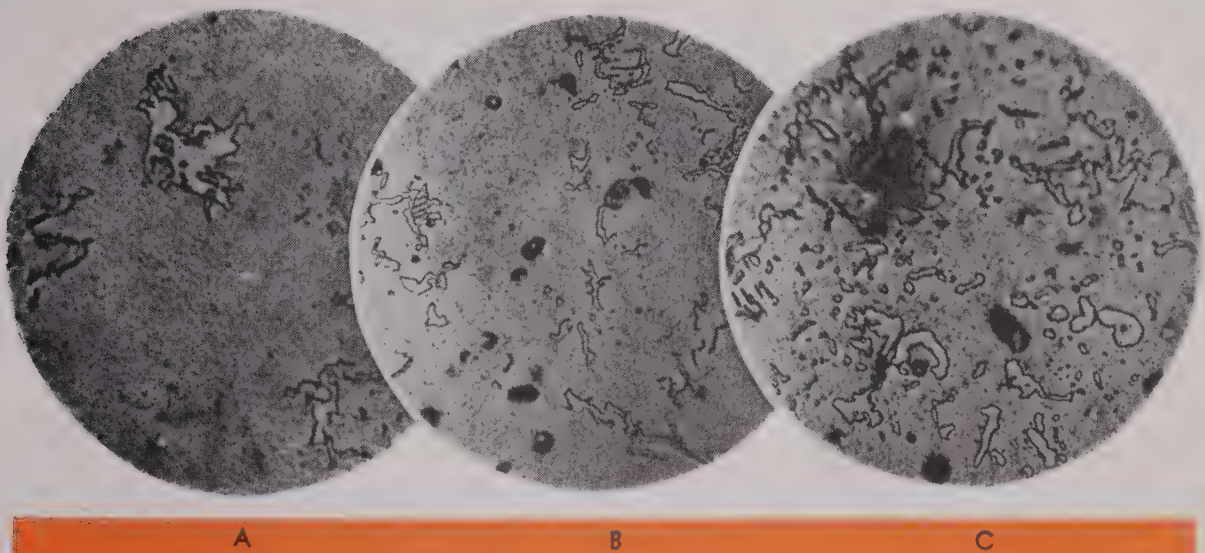


FIG. 8—Mixtures containing graphite plus 5 pct Cu. As reheated to 1525° to 1575°F, oil quenched, drawn at 1300°F: (A) 0.40 pct graphite, final C = 0.21 pct — etch picral; (B) 0.65 pct graphite, final C = 0.35 pct — etch picral; (C) 1.05 pct graphite, final C = 0.75 pct — etch picral. 1000X.

TABLE IV

Properties of Copper-Containing Mixtures Compared with Non-Copper Containing Mixtures of Similar Carbon Contents

Mixture	Reduced Iron + Graphite + Copper	Reduced Iron + Graphite	Electrolytic Iron + Graphite
C, Pct.....	0.38	0.38	0.38
Cu, Pct.....	1	0	0
Yield Point, Psi.....	44,750	40,000	39,300
Tensile Strength, Psi.....	60,650	55,500	60,000
Elongation in 1 in., Pct.....	8.5	8.5	21.5
Reduction in area, Pct.....	8.0	6.3	22.5
Density, G per cc.....	6.95	7.10	7.50
C, Pct.....	0.33	0.33	0.33
Cu, Pct.....	2	0	0
Yield Point, Psi.....	57,550	38,000	38,700
Tensile strength, Psi.....	68,650	54,000	58,200
Elongation in 1 in., Pct.....	6.0	9.4	22.5
Reduction in area, Pct.....	3.7	7.0	24.0
Density, G per cc.....	7.03	7.10	7.52
C, Pct.....	0.50	0.50	0.50
Cu, Pct.....	5	0	0
Yield Point, Psi.....	79,650	43,500	41,000
Tensile strength, Psi.....	83,100	59,500	65,000
Elongation in 1 in., Pct.....	2.0	6.6	17.0
Reduction in area, Pct.....	1.6	4.5	17.0
Density, G per cc.....	6.84	7.08	7.47

carbon contents. The pearlite tends to be coarse, and inclusions of primary copper (showing pinkish under the microscope) are to be seen.

Fig. 7 shows the same compositions as fig. 6 after reheating, oil quenching and drawing at 600° to 800°F, depending on the carbon content. The pearlite in figs. 7A and 7B is much finer than in figs. 6A and 6B, and the amount of ferrite areas has decreased. Fig. 7C reveals a tempered martensite formed by the quenching of a higher carbon content material and its subsequent drawing.

Fig. 8 shows the same material as oil quenched from 1525° to 1575°F and drawn at 1300°F. The cementite has tended to spheroidize in all cases and the structure has given the higher elongation and reduction in area values shown in fig. 4.

This article was presented by the author at the International Powder Metallurgy Conference held in Graz, Austria, in the summer of 1948.—Ed.

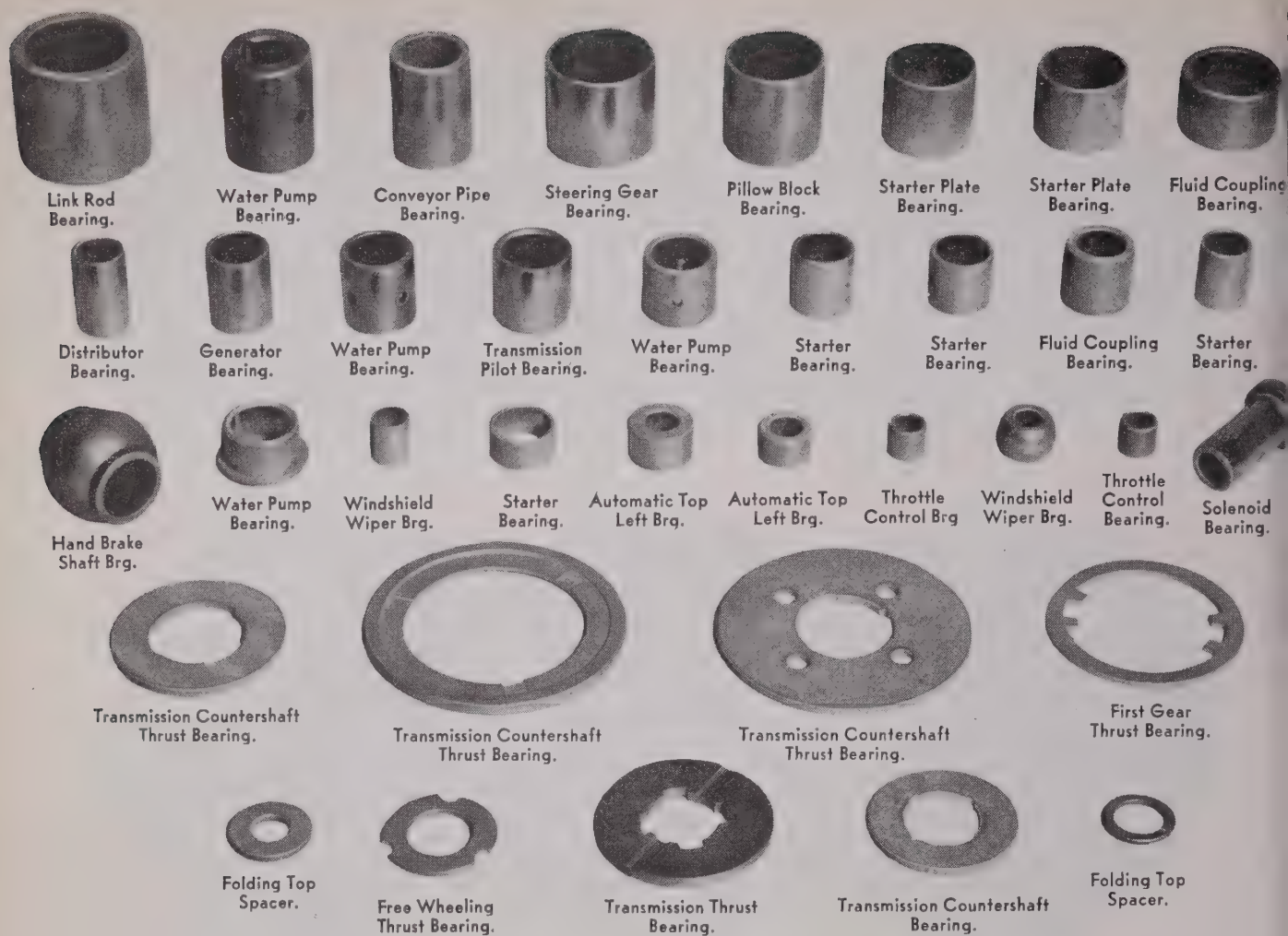


FIG. 1—Representative of the bearings used by the automotive industry are these nonferrous, Oilite bearings used in Chrysler automobiles.

Pressed Metal Powder Applications

Realizing the economic advantages of powder metallurgy as a manufacturing method, the automotive industry is continually expanding its use of pressed metal powder parts. Although oilless bearings currently represent the bulk of metal powder part production, General Motors Corp., Chrysler Corp. and Ford Motor Co. have employed powder metallurgy for making functional components and filters. The Ford car utilizes some 30 powder parts, in addition to bearings and bushings.

POWDER metallurgy received its start in the automotive industry in 1921 when General Motors Corp. began experimental work on porous bearings, later known as oilless bearings. It rapidly became obvious that there was a large potential use for these parts and as a result, the

Moraine Products Div. of General Motors Corp. was formed to conduct development work and to produce metal powder parts. The Amplex Div. of Chrysler Corp. and the Ford Motor Co. are now also producing powder parts, and many other companies not directly affiliated with the



FIG. 2—Some typical ferrous and nonferrous Oilite finished machine parts used in Chrysler automobiles.

in the Automotive Industry

By D. C. BRADLEY
Market Development Div.,
New Jersey Zinc Co.,
New York

automotive industry are supplying parts for automobiles, trucks, tractors and marine motors.

Basically the process consists of (1) filling a die with powder, (2) compressing the powder under a definite pressure, (3) sintering or heat treating the "green" part at a temperature close to but under the melting point of the major ingredient, and (4) in some cases, sizing the part to final dimensions. Iron, brass, bronze and copper powders are commonly used, although it appears that alloy combinations that are impossible or impractical to make by other methods, may become important.

At the present time the bulk of the pressed powder part production is of oilless bearings, pressed and sintered parts with a definitely controlled porosity which usually runs from 20 to 30 pct by volume. The compacts are impregnated with oil and because the pores are interconnected, capillary attraction tends to keep the bearing surface lubricated. This reservoir of oil held in the part is limited however, and should be backed up by an additional oil supply if the part is subject to much wear.

Fig. 1 shows a group of bearings representative of those used by the automotive industry



FIG. 3 — Four automotive parts which can be made more economically by powder metallurgy than any other means.

o o o

in such applications as the water pump, steering gear, starter motor, distributor, windshield wiper and generator, and are for the most part made from bronze powders. Experimental work has indicated, however, that in many cases brass or iron powder bearings are suitable, and since additional economies may be derived from their use, there will undoubtedly be many applications changed to or developed for these metals. Mixtures of iron and brass, iron and copper or other combinations likewise appear to have interesting possibilities.

In fig. 2 are shown some typical automotive parts. These parts demonstrate applications that are ideal for the powder process since in each case the part is not easily adaptable to other processes.

It was logical that with the successful development of metal powder bearings and bushings, experimental work would be performed on the possibility of making other functional parts such as gears, pistons, cams, pump rotors, valve bodies, etc. At first, parts designed for other production methods were adapted to powder, making a minimum number of changes. As the number of successful applications increased, it became apparent that pressed powder parts offered designers certain desirable properties if those parts were designed for powders, taking into account the advantages and limitations of the process.

Fig. 3 shows four parts, each of which would

be difficult to make economically by any means other than powder metallurgy and still achieve the required physical properties. In each case the desired shape, while difficult to machine, is formed from powder in a single pressing operation and the properties are developed by sintering; in some cases a subsequent coining operation is employed.

In fig. 4 are shown two examples of material saving. As a screw-machine part, well over 50



FIG. 4 — The piston and plunger shown represent two examples of material saving. As a screw machine part well over 50 pct of the original stock of each of these components would have to be machined off.



FIG. 5—Two examples of parts which require machining operations subsequent to pressing and sintering and which still show economic advantages over other processing methods.

pct of the original stock would have to be machined off, whereas when made of powder, there is no appreciable waste. This factor of material saving is one of the major advantages of powder metallurgy. Although the piston and plunger illustrated are extreme examples, most parts made from powder (other than oilless bearings) show considerable material saving and the resultant economy is frequently the deciding factor in selecting powder metallurgy as the manufacturing method.

Because of the present limitations of the process, some secondary operations are occasionally required. Threads, undercuts or holes not parallel to the direction of pressure application cannot be formed, and if required necessitate a subsequent machining operation. Powder parts are equally as machinable as cast metals of similar composition, and if the part is of such shape that a large percentage of the original stock would have to be machined off prior to the tapping, threading, drilling or other operation, powder parts may still prove most economical.

Fig. 5 shows two examples of this. The outside contours of these pieces would be difficult and expensive to machine whereas they are well adapted to pressing, while in either case the tapping or drilling operation is still required.

One of the present restrictions of the process is that the length of any given part should not exceed the diameter by too great a degree—roughly $2\frac{1}{2}$:1—when high density is required throughout the compact. Two examples where the length:diameter ratio exceeds this are illustrated in fig. 6, where the exhaust valve guide is approximately 4 times as long as the diameter and the distributor bearing is approximately $4\frac{1}{2}$ times as long. In neither of these two parts is the density critical.

The parts discussed so far are made from powders of an irregular shape. Filters, however, are made from powders in which each particle is spherical in shape. By using powders of a uniform particle size, filters can be made which have a definite pore size. In this way filters can be made which have the characteristics of those made from other materials and the added advantages of being made from metal.

Two of the most common types of filters used on automobiles are shown in figs. 7 and 8. The one made by Moraine Products (fig. 7) is located at the carburetor and may occasionally have to be replaced or cleaned because of clogging. The part made by Chrysler Amplex (fig. 8) is inserted directly into the gas tank as a permanent installation—the sloshing action of the gasoline serves as a continual washing mechanism. In an actual test run by U. S. Army Ordnance, 600 cc of ice crystals were placed in the fuel tank of each of a group of trucks. Three different methods of filtering were employed and the Chrysler Amplex filter showed the unique ability to filter out moisture as well as dirt.

Besides automobile filters, spherical metal powders are used to make parts used for mixing, separating, metering, diffusing, flame arresting and other similar applications.

The number of pressed powder parts in the various makes of automobiles varies from model to model. In a Ford car, for example, there are approximately 30 powder parts in addition to the bearings, bushings, etc., which are already in such assemblies as the windshield wipers, generator and heater blower motor.

The automotive industry has certainly been the leader in utilizing powder parts, and with the three large producers of powder parts connected with the automotive industry and many independent producers conducting research and development programs on improved materials and production methods, the fields of application for powder parts in automobiles and allied fields will more than likely continue to expand.



FIG. 6—An exhaust valve guide and a distributor bearing indicate the flexibility of length:diameter ratio possible with metal powders.



FIG. 7—An automobile filter made by Moraine Products Div. of General Motors Corp.



FIG. 8—An automotive filter made by Amplex Div. of Chrysler Corp. which is inserted into the gas tank as a permanent installation.



Magnetic Fluid Clutch

Employs Iron Powder



A MAGNETIC fluid, useful in a number of devices, such as the magnetic clutch, dash pots, hydraulic valves, shock absorbers, etc., consists of (1) a powder of some magnetic material, (2) an oil or other vehicle, and (3) an additive to improve the physical characteristics of the mixture of powder and vehicle. The characteristics which the fluid must possess to serve in a diversity of devices varies over a considerable range. In some, extreme fluidity is required at all times, while in others, a thixotropic characteristic is requisite.

This principle is illustrated in the accompanying photographs. The magnetic fluid contains carbonyl E iron powder, silicone (50 centistokes at 25°C viscosity), and

polyethylene glycol oleate (to produce thixotropy). Operation of the magnetic clutch will be described in detail at the Chicago MPA meeting, April 5 and 6, by H. D. Saunderson, National Bureau of Standards.

The accompanying photograph (upper left) shows the mixture ready for use. In the next operation (upper right) the fluid is poured into an open tube which has a coil around it. The coil is energized, setting up lines of force through the mixture and freezing it, preventing flow. De-energizing the coil (lower left) permits the fluid to flow and in the illustration (lower right) the coil is again energized, refreezing the mixture. The small pig-tail of fluid will remain in the position shown.



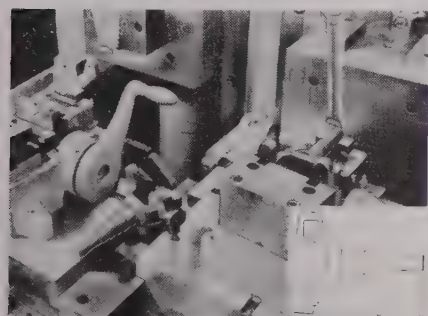
New Production Ideas . . .

Special machines for surface broaching and for boring and facing operations, spot and arc welders, a core baking tunnel, electric box furnaces, an electronic sequence control unit, a powered gaging handle, a sand conditioner, and bridge plates are discussed this week. Small tools include forged bits and boring bars, notching units, and solid carbide cutters.

THE ends of rough forged steel steering knuckle spindles are broached on this XD-10 x 42 double slide vertical surface broaching machine to provide a locating point for subsequent operations. Open type, quick-acting clamping fixtures, that allow easy loading from the top, have swiveling resistance blocks to compensate for variation of camber angle between pieces. The part is clamped by pulling the clamp handle, moving pins in clamping bar against mounting lugs of the part. One fixture is loaded while the spindle in the other fixture is being broached.



eye setup. At station three, the parts are automatically sorted by type and placed onto either one of two conveyers, depending upon subsequent processing requirements. One conveyer that travels at right angles to the machine, receives all axles with insulator brackets attached, either long or short; the second conveyer, a continuation of the flow of work through the machine, receives all other axles. Flexibility for part design changes is provided. Other features include hydraulic feeds, hardened and ground steel ways, and automatic push-button controlled working cycle. *Cross Co. For more information, check No. 2 on the attached postcard.*

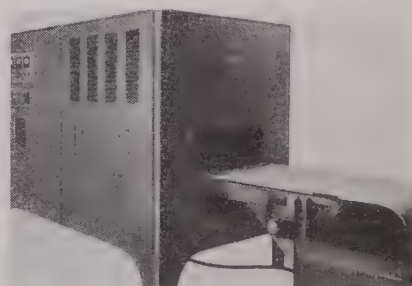


Maximum stock removal is $\frac{1}{4}$ in. Maximum cutting speed is 30 fpm and production is rated at 410 parts per hr. *Oilgear Co. For more information, check No. 1 on the attached postcard.*

Special Boring-Facing Machine

A NEW machine tool bores and faces three types of automotive axle housings without changing the setup, processing at 100 pct efficiency 280 parts per hour by one unskilled operator. The machine is a three station Transfer-matic. Three types of axles come to the machine in two different lengths. At the first station, any three of these are loaded. At station two, both ends are bored and faced with the machine automatically adjusting for length through an electric

cores within the prescribed range. After the baking cycle, cores emerge from the other end and go directly to the inspection table. The process involves dielectric heating principles used in conjunction with synthetic resin-type core binders. Heat is generated directly within the core itself, resulting in uniform temperature rise throughout the mass of the foundry core regardless of shape or dimensions. It also inherently provides automatic temperature control; no cooling period is necessary. Input rating of the unit is 70 kva at full load, 90 pct power factor, 410/490



v, three phase, 60 cycles. The unit is 22 x 5 x 6 ft 8 in. *Induction Heating Corp. For more information, check No. 3 on the attached postcard.*

Core Baking Tunnel

THE newest electronic core baking tunnel reduces core-baking times from hours to minutes, baking a 100-lb block of core sand mix having a 2 pct moisture content in approximately 3 min. The Model M-1800-A has a sand capacity of 1500 to 2000 lb per hr. Cores up to 12 in. high (including core and core plate or drier) and 30 in. wide are accommodated. Cores are loaded directly on the conveyer that carries them at a predetermined rate between two heating electrodes. By push-button control, the distance between the electrodes is adjusted to handle batches of different size

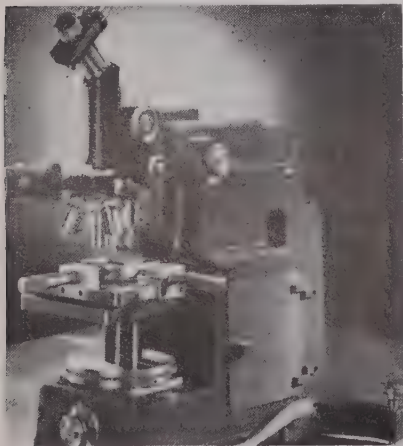
Spot and Arc Welders

THREE new welders, the Dual Weld combination spot and arc welder, a 5 kva spot welder, and a portable 120 amp arc welder, have been marketed. The Dual Weld unit spot welds, arc welds, solders and brazes. It has a 10-in. throat depth for spot welding. A hand lever permits simple and quick changeover from arc to spot welding. The one-piece welding horns are a solid, high-conductivity, high-strength, copper alloy casting. The wound transformer core for extremely low watt-loss is a feature of the combination unit. The welder

is 14 in. wide x 19 $\frac{3}{4}$ in. high x 26 $\frac{5}{8}$ in. long. For nonferrous and light jobs, full spot weld pressure adjustment gives infinite control from minimum to maximum pressure. The 5 kva spot welder, for light fabrication, delivers a maximum of 7000 amp and operates on 230 v, single phase, 50/60 cycles ac. This welder can be converted to full automatic by adding air equipment and a weld timer. Overall dimensions are the same as the Dual Weld. The portable arc welder, rated at 120 amp at 25 load volts, is a light duty, limited-input transformer type welder. Its speedy voltage recovery provides a steady arc and the current has infinite adjustment between 30 and 120 amp. Its open circuit voltage is 65 v and its duty cycle at rated load is 20 pct. Electrodes recommended range from 1/16 to 1/8 in. diam. *Delta Mfg. Div.* For more information, check No. 4 on the attached postcard.

Micro Hardness Tester

A NEW micro hardness tester applies accurately dead weight loads as light as 1 g, for use with either the Knoop or the Vickers indenters. This accurate application is said to make possible testing of minute particles, inclusions, con-

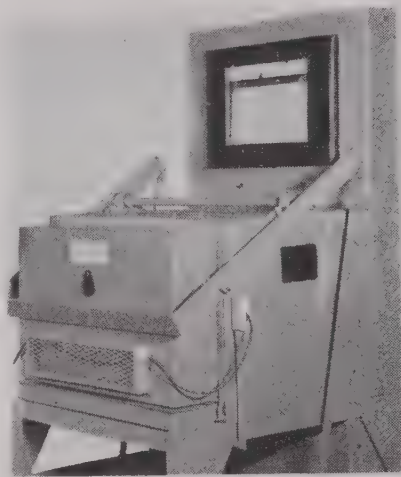


stituents, thin metals, transition zones of welds, wire, foil, enamels, etc., both natural and synthetic. The Kentron tester is a bench type hand-operated instrument. An oil dash pot, for controlling the speed of load application and time of load retention, is adjustable to specific testing requirements. A mechanical stage, consisting of a stationary plate, a transfer plate and a specimen block, provides for positively locating and positioning the exact area of the test specimen

underneath the indenter and microscope. Dead weights for applying loads of 1 to 1000 g and optical measuring equipment are standard equipment. *Kent Cliff Laboratories.* For more information, check No. 5 on the attached postcard.

Electric Box Furnace

RAPID heating, uniformity of chamber temperatures, and economy of operation are claimed for a new series of industrial box furnaces, designed for operation



to 1850°F, with chamber dimensions of 12 in. wide x 8 in. high x 18, 24, and 36 in. long. The furnaces have resistors embedded in ceramic slabs. In the side walls they are so placed that an air space is left behind, above and below the slab which then forms a baffle wall creating a natural convection when heated. This arrangement equalizes furnace temperatures and causes cool operation of the element and furnace wall. The door that completely covers the operating end of the furnace insulates the front section equally with the other furnace walls, eliminating the need for heavy fire brick in the vestibule and in the door, and consequently eliminating front end heat losses. Full automatic control is mounted in a completely wired control panel including multi-breaker line switch and fuses, or arranged so that the control and switch equipment can be mounted on a wall separate from the unit. *Cooley Electric Mfg. Corp.* For more information, check No. 6 on the attached postcard.

Weld-Time Meter

A NEW weld-time meter for measuring the duration of welding current furnishes an accurate measure of the duration

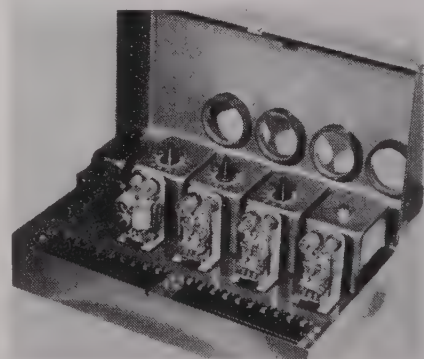
time of the weld and is used to check the schedule set by the welding control. The unit is portable and can be carried easily in one hand. It is a direct reading instrument that totals the weld time and gives values in seconds and cycles. A built-in calibrating device eliminates need for a separate source of supply. It can be built directly on to the welding machine or control. The meter is insensitive to heat control. *Westinghouse Electric Corp.* For more information, check No. 7 on the attached postcard.

Solid Carbide Cutters

TWELVE different shapes comprise a new series of carbide cutters, known as Carbo-Mills, that have 1/8 in. diam shanks and are made of solid carbide in one piece, cutting heads and shanks being integral. Carbo-Mills are recommended for production deburring and machining of parts made from materials that are abrasive, tough, or have hardness ranging up to 60 Rc. They can be reground over and over. *Severance Tool Industries Inc.* For more information, check No. 8 on the attached postcard.

Electronic Control Unit

ELECTRONIC control of any type of sequence or process control is possible with a new com-

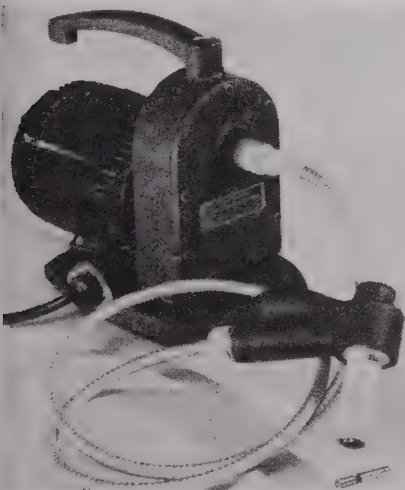


pletely engineered and prefabricated unit. Without any special preparation, stock plug-in units are available that will handle any sequence of operations whether it has one or a thousand stages. Individual units perform the operations in the sequence—time measurement, distance, light, sound, vibration, temperature or force. These can be any combination and can be changed to any other combination of like number of sequence without internal wiring changes. All operating

stages are automatically interlocked, and when the sequence is complete it is automatically reset. The entire system can be paralleled with like units where extreme reliability is paramount. Each unit has a signal lamp to show where failure has occurred. *Hydraulic Research & Mfg. Co. For more information, check No. 9 on the attached postcard.*

Powered Gaging Handle

FASTER inspection of internally threaded parts and reduced operator fatigue are obtainable with a new power-driven gaging handle. With this inspection tool, manual rotation of a gage is eliminated. The gaging handle mechanically screws the gage into and out of the work at a speed of 4 rps. Immediate reversal, or automatic dis-

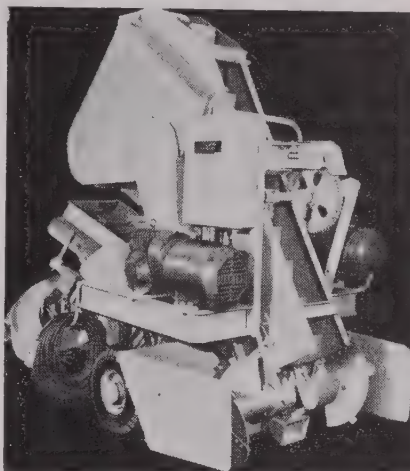


engagement of the drive, is obtained by a slight change in the applied pressure. The gage is available for AGD gage blanks Nos. 4, 5, 6, 8, 10, 12, $\frac{1}{4}$ in., $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$ and $\frac{1}{2}$ in. It is made for 110 v ac. *Taft-Peirce Mfg. Co. For more information, check No. 10 on the attached postcard.*

Sand Conditioner

WITH the new Nite-Gang the foundry industry has a machine that provides the molder with thoroughly blended, iron free, evenly tempered, fully aerated sand. The machine moves under its own power while loading or traveling from floor to floor and pneumatic tires provide positive traction on irregular or wet, muddy surfaces. The loading mechanism consists of spirals and blender and bucket elevator, the spiral blending wet sand with dry and new sand

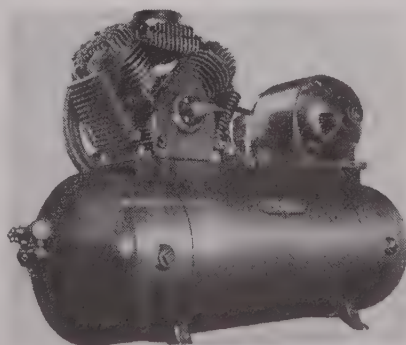
with used, from top to bottom and from side to center of the pile. A magnetic separator, mounted in the elevator tower discharge chute, re-



moves scrap iron and shot from the sand before it is screened. The Screenator unit breaks lumps and thoroughly screens the sand before discharging it into windrow or pile anywhere within a radius of 40 ft and within an arc of 240° . Double aeration provides fluffy, completely prepared sand. Speed of the machine is variable from $4\frac{1}{2}$ to 36 fpm, forward or reverse. *Beardsley & Piper, Div. of Pettibone Muliken Corp. For more information, check No. 11 on the attached postcard.*

Air Compressors

MORE compressed air for each unit of electric current consumed is a feature of three new large capacity compressing outfits for stationary installations. Such



features as four-cylinder balanced V pump, enlarged and highly refined cooling system, floating type tank mount, highly sensitive and efficient valve design provide high efficiency, smooth, quiet operation and long service. Employing a two stage principle in both banks of cylinders, the displacement of the 10 hp unit is 47.86 cfm at 175 psi.

High displacement is also attained in the 15 hp and $7\frac{1}{2}$ hp models, that are available for 175 or 125 psi use. Better compressor design also includes dynamically balanced, forged crankshaft, forged connecting rods with automotive type pre-fit bearings, efficient air filter and muffler, and frictionless ball type main bearings. The outfits operate from all common electrical currents, meeting code requirements of different cities and states. *De-Vilbiss Co. For more information, check No. 12 on the attached postcard.*

Industrial Nozzles

SPRARITE industrial nozzles, redesigned for greater manufacturing efficiency and economy, are manufactured in 17 sizes to fit



$\frac{1}{4}$ to $2\frac{1}{2}$ -in. pipe connections. They retain their original, non-clogging helical vane principle, producing a uniform, full cone mass spray throughout the entire cross section of the spray pattern. Fluid travels around the two vane helix, which sets up two rotating jets, to produce the full mass spray. The design of the core allows fluid to pass freely and is practically clogproof. *Binks Mfg. Co. For more information, check No. 13 on the attached postcard.*

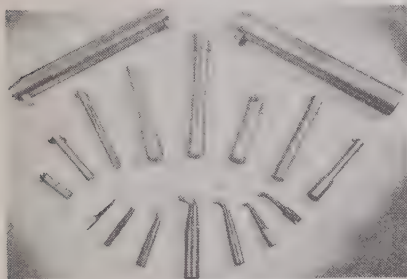
Jaw Clamps

FOR securing workpieces to the face plates or table of machine tools, a jaw clamp no higher than 15/16 in. makes it possible to pass over the whole clamp when holding work 1 in. high or more. The jaw is $\frac{23}{64}$ in. thick. This clamp facilitates controlled centering adjustment on the clamped workpiece and eliminates secondary operations. This all-purpose jaw clamp

is available in sets of four, including standard socket wrenches, hardened T-slot nuts, special bolts and hardened washers. *J & S Tool Co. Inc. For more information, check No. 14 on the attached postcard.*

Forged Bits and Boring Bars

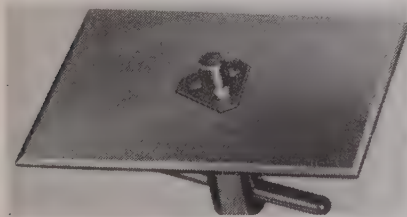
A STANDARD line of forged bits and boring bars fit any standard tool holder and are avail-



able in a range of sizes for boring, facing, recessing and similar operations. Forged bits of high speed steel are available with $\frac{3}{8}$ to 1 in. shanks in increments of $\frac{1}{8}$ in. Minimum boring capacity ranges down to $\frac{1}{4}$ in. for the $\frac{3}{8}$ -in. shank and proportionately the same for other shank sizes. Maximum depths for each of the shank sizes are also offered. Boring bars of alloy tool steel are available in minimum bore and maximum depths with shank sizes from $\frac{1}{2}$ to $1\frac{1}{2}$ in. in increments of $\frac{1}{4}$ in. and have straight or angular insertable bits. Cutter angles are 60° and 45° . A short stub boring bar series is recommended for facing or boring short holes. *Maxwell Co. For more information, check No. 15 on the attached postcard.*

Self-Locking Retainer

A NEW self-locking device, designated Truarc Triangular Retainer, is useful in developing tight assemblies free from end-

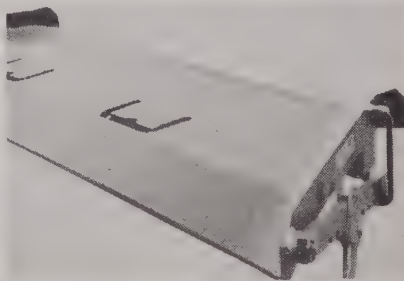


play, on relatively soft shafts such as cold rolled steel, castings and plastic materials. The new retainer, requiring no groove or special tools for assembly and disassembly, is made with a flat or spherical cross-section, and has three equally spaced projecting

prongs. When slipped over a shaft, the three prongs tend to lock securely around the shaft when the slightest pressure is applied from the opposite direction. Since the prongs maintain equal loading, the retainer effectively resists considerable thrust loads, vibrations and impacts. Retainers are available in shaft diameters from 0.090 to 0.375 in. *Waldes Kohinoor, Inc. For more information, check No. 16 on the attached postcard.*

Bridge Plates

FOR safe bridging of the gap between platform and freight car, new bridge plates are fabricated of safety tread floor plate with side curb protection, and crowned to take care of different levels up to 6 in. between platform and car. Collapsible lifting handles facilitate easy positioning and transporting. A positive locking device and wide range of adjustment assure safety. Heavy side



curbs and center reinforcing are designed to take heavy loads without strain. Platforms are rectangular or flare shape, made in 15,000-lb load capacity with platform ends 65 to 92 in. long x $29\frac{1}{4}$ to $59\frac{1}{2}$ in. wide with span of 5 to 46 in. *Fab-Weld Corp. For more information, check No. 17 on the attached postcard.*

Gravity Roller Conveyers

NEW gravity roller conveyers are made in 5 and 10-ft lengths and widths from 6 to 36 in. in increments of 2 in. Rollers are 2-in. diam. 16 gage steel with special ball bearings on both ends. Steel roller axles are made of $\frac{7}{16}$ in. hexagon bars and set in hexagon holes in frames so that shaft or cone does not turn on the axle. Spring locks that hold axles in place allow rollers to be removed from the frame without the use of tools. Straight and curved sections are welded steel, their light weight and simple connectors making pos-

sible one-man assembly and handling. No tools are required. Conveyers are portable or for permanent use. *Sage Equipment Co. For more information, check No. 18 on the attached postcard.*

Notching Units

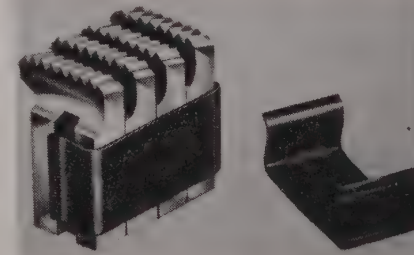
HEAVY duty notching units provide maximum 5 x 5 in. 90° corner notches in metal up to



$\frac{1}{4}$ in. thick mild steel. They are independent and self-contained with nothing attached to the press ram. These features provide rapid setups in stamping presses and press brakes for long or short runs. Complete setups, ready to operate may be made outside the press on T-slotted plates or templates. *Wales-Strippit Corp. For more information, check No. 19 on the attached postcard.*

Chaser Clip

A SPRING steel clip provides a permanent and convenient way of holding chasers together in a set before and after using. The chaser clip is furnished as standard equipment with Supermetric chasers. The clips prevent the loss of individual chasers; avoid mixing with other sets; save chaser teeth from damage; make handling more convenient; simplify issue of chasers from tool crib; and keep



them together at all times. *Geometric Tool Co. For more information, check No. 20 on the attached postcard.*

Indestructible Folding Rule

A NEW Bright White enameled 6 ft zig zag folding rule made of a special hardened and tempered

alloy steel can be bent and twisted yet springs back to its normal shape. The rule weighs 3 1/5 oz. The white enamel finish is specially bonded on to pretreated steel and baked at over 500°F, producing a hard and adherent finish. *Durall Tool Corp. For more information, check No. 21 on the attached postcard.*

Aluminum Fasteners

DUPLICATES in aluminum of 551 sizes and types of fasteners include those of wood and metal screws, machine bolts, nuts, washers and nails. Advantages are: Three times as many to the pound as steel or brass; they do not rust, inside or outside, when used with wood or aluminum construction. They are stocked in 100 piece and one gross boxes. Small order stocks of individual gross boxes are housed in a cabinet 25 x 10 x 3 ft. *Central Steel & Wire Co. For more information, check No. 22 on the attached postcard.*

Reversible Plug Gages

IN a new line of reversible, cylindrical plug gages, the plug can be quickly and easily reversed whenever an end shows wear. The handle has a positive locking action so that the plug cannot slip and the entire gage has a rigidity equivalent to that of a solid gage. These AGD gages are available in sizes from 0.025 to 0.0510 in. both *go* and *not-go*. They are made in alloy steel, high speed tool steel, and tungsten carbide, and can be had plain or chromium plated. *Taft-Peirce Mfg. Co. For more information, check No. 23 on the attached postcard.*

Gas Boiler Burner

COMplete automatic burner assemblies for gas-firing boilers from 10 to 180 hp need only gas piping and electric wiring to complete the installation of the pre-engineered elements of the new series. Protective equipment and pressure controls complete the packaged units. The principal element of the boiler burner is the Pow-R-Semby, including constant pressure blower, single or double burner nozzles each with compact proportional mixer, zero regulator, motorized air valve, electric ignition pilot, and manual reset safety gas valve. The burners operate

automatically over three steps of heat output. *Bryant Industrial Div. For more information, check No. 24 on the attached postcard.*

Adjustable Pallet Rack

A NEW type pallet rack for storage of loaded pallets has been designed with shelves adjustable for any height load without the use of bolts or wrenches. The shelf is supported at four corners on notched uprights, and can be adjusted upward or downward by a fork lift truck. The base rack can be expanded in either direction by additional units of one upright section and cross braces bolted into place. *Rack Engineering Co. For more information, check No. 25 on the attached postcard.*

Reflecting Hose

SAFETY is enhanced with the use of a new industrial wrapped hose that reflects light. The reflecting feature is a tough, flexible plastic tape on which is spread a smooth coating of microscopic glass beads. The tape is affixed to the outer surface of the hose spirally and tests have proved that it re-

mains in place as a permanent, integral part of the equipment. The space between spirals is approximately 6 in. Reflecting hose lying across aisles is a signal rather than a hazard because a perceptible line of light from any illumination in the vicinity can be seen on the flooring. *Quaker Rubber Corp. For more information, check No. 26 on the attached postcard.*

Unit Bearing Motors

SUITABLE for use as drives for fans, blowers, and small pumps, a new line of unit bearing, shaded pole FHP motors are available in these ratings: 1/40 hp, 60/50 cycle, totally enclosed; 1/25 hp, 60 cycle, totally enclosed; and 1/15 hp, 60 cycle, open. All ratings are available for 115 or 230 v and for CW or CCW rotation. Each of the three ratings can be used for horizontal or vertical shaft operation, and obtained with identical outline features. Mountings include shaft-end, opposite shaft-end, and resilient-base. Motors have die cast aluminum frames. *General Electric Co. For more information, check No. 27 on the attached postcard.*

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Information Free . . .

POWER SHOVELS—Electrical equipment for power shovels and draglines is presented in catalog GEA-4843. Included among equipment which is illustrated are motor generator sets, drive motors, amplifier controls and auxiliary motors and controls for all types and sizes of machines. *General Electric Co. For more data, check No. 28 on the attached card.*

FLOOR CHAIN CONVEYER for moving shop trucks along a circuit is described in folder. The conveyer runs below the floor. Trucks are equipped with a vertical pin which is engaged by pusher dogs on the chain when it is dropped through the floor slot. *Jervis B. Webb Co. For more information, check No. 29 on the postcard.*

FRICTION SAWS for production cutting of structural shapes, rounds, squares, pipe, rails and other sections are covered in bulletin 9400. Average cutting times for the various sections, severed with the lower front arc of a hobbled blade of 60 in. diam and $\frac{3}{8}$ in. thickness, are given. *Kling Bros. Engineering Works. For more information, check No. 30 on the postcard.*

HIGH SPEED STEELS, with information on analyses, heat treatments and applications, are described in 12-page catalog. Charts showing hardness values after heat treatment are included. The steels are available in a variety of forms, including bars, plates, sheets, forgings, drill rods, finished tool bits and special shapes. *Jessop Steel Co. For more information, check No. 31 on the postcard.*

FLOOR RESURFACER—A method of laying new floors over old by applying a permanent, resilient surface to any concrete, wood or other type of floor having a solid base, is described in folder. Another folder lists features of a plastic floor resurfacer designed to stand loads up to 50,000 lb. *Monroe Co., Inc. For more data, check No. 32 on the attached card.*

HOT WORKING METALS—How hot working improves the properties of metals is explained in catalog. This illustrated story of steel treating includes a story of hot working of ingots to billets and bars. Forging quality steels are discussed and several methods of working steel by forging are described. *Drop Forging Association. For more information, check No. 33 on the attached postcard.*

WIRE ROPE making is discussed in booklet. Production steps from the heat treatment of rods through cleaning, drawing, galvanizing, spooling and welding operations to the actual stranding of the rope are described. A variety of patterns of construction and typical uses of wire rope are shown. *Union Wire Rope Corp. For more data, check No. 34 on the card.*

BRINELL HARDNESS reader which indicates hardness numbers directly on being pressed into the impression is described in leaflet. The device assures identical readings, regardless of the judgment or skill of the operator, and is pocket-size. *Harry W. Dietert Co. For more information, check No. 35 on the postcard.*

JIG BORERS — Jig boring machines which are also designed for use as production machines are illustrated in folder which also includes schematic drawings and detailed specifications. The machines are also recommended for workshop measuring and checking. Numerous accessories are illustrated. *Hauser Machine Tool Corp. For more information, check No. 36 on the attached postcard.*

PLATE WORKING—Catalog No. 10 E describes a universal machine for cutting, beading, edging and working sheet and plate. Scope of operations performed by this line includes straight shearing, circular shearing, figure shearing, and folding. Five models are illustrated as typical designs produced. *Pullmax Co. For more data, check No. 37 on the attached card.*

TURRET PUNCH PRESSES — Features of turret punch presses illustrated in folder include 12 punches and dies mounted in two revolving turrets to reduce set-up time and material positioning and gaging arrangements designed to reduce layout time. Typical samples are pictured and times required to produce them are given. *Wiedmann Machine Co. For more data, check No. 38 on the attached card.*

FURNACE OBSERVATION — Thirteen salient features of a furnace observation door are listed in folder which shows several typical installations. Diagram shows parts and manner in which lens frame is cooled by convection air currents. *Bigelow-Liptak Corp. For more information, check No. 39 on the attached card.*

MODERN STEELMAKING — Bulletin devotes 64 pages to modern steelmaking from mines to finished steel. Discusses each phase in detail. Contains numerous illustrations with sketches, diagrams and photographs. Prepared in non-technical style for executives, workers and students. *Inland Steel Co. For more information, check No. 40 on the attached postcard.*

SHEET METAL MACHINERY for shearing and rolling varying lengths and thicknesses are described in catalog 22. Specifications on power and foot-operated squaring shears, slip roll formers and combination machines are given. All ways in the machines are hand scraped, and solid, standard alloy 4-edge blades are standard equipment. *Wyson & Miles Co. For more information, check No. 41 on the postcard.*

MACHINE TOOL ATTACHMENTS and accessories are described in 28-page catalog 77-U. More than 130 items are included. Among these are lathe dogs, metric and English transposing gears, boring and knurling tools, centers, reamer grinding stops and coolant systems. *South Bend Lathe Works. For more information, check No. 42 on the postcard.*

AUTOMATIC LEVELING RACK designed to eliminate stooping and lifting in machine operations, is described in folder. Platform of the rack is spring-powered so that as materials are removed, the platform raises to deliver the next batch, or correspondingly lowers as weight is added. Closed and open types are available. *American Machine & Foundry Co. For more data, check No. 43 on the card.*

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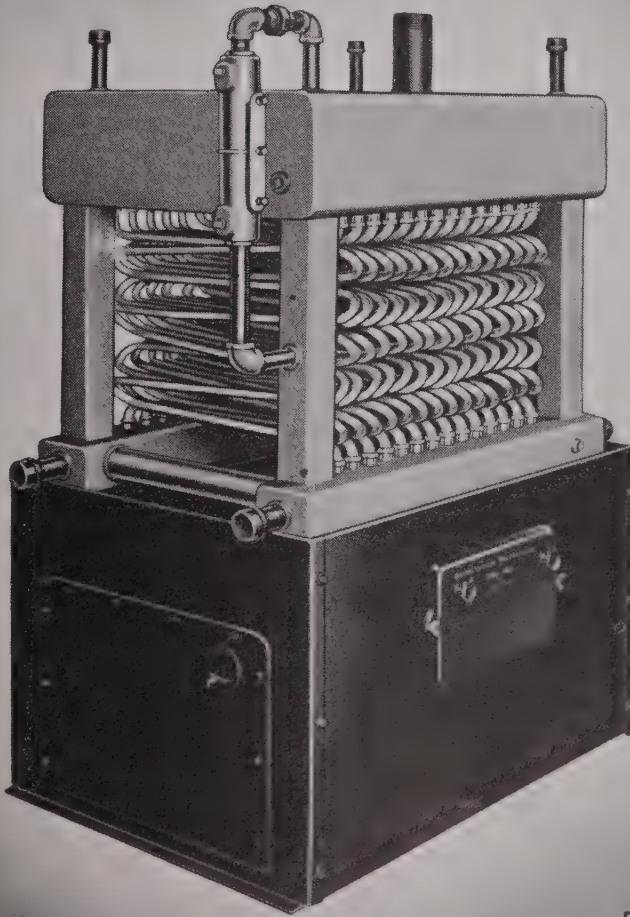
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COPPER TUBE

A VITAL FEATURE OF BRYAN BOILERS



Bryan Steam Boiler with housing removed, showing copper tubes. Bryan claims 75 pounds of steam in 15 min. from cold start, due to high heat conductivity of the Revere tubes. Also made in low-pressure and hot water models.

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THE big feature of the boilers made by the Bryan Steam Corp., Peru, Indiana, is that they use copper tubes. Another important item is engineered design to meet the requirements of the fuel, whether gas or oil. Let Bryan tell the story:

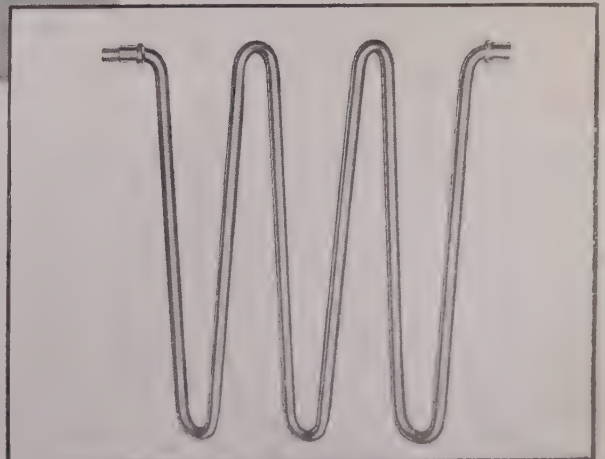
"The Bryan Copper Tube Boiler was started with a double-barreled idea. The first part of the idea was that boilers could be made more efficient by using copper tubes. Copper transfers heat many times as fast as cast iron or steel. Heat from a fire is transferred through copper tubes to water in record time, and in a Bryan Boiler with minimum heat loss through the flue due to the design.

"The second part of the idea was that if a boiler could be engineered expressly for gas or oil, the economy of operation would be such as to revolutionize the heating industry."

The first Bryan Boilers were a sensation when offered over 20 years ago. Today they are made in a number of sizes, from domestic types to 50 hp high-pressure units for industrial uses. Revere Copper Tube is used.

This is another illustration of a favorite Revere statement: "Copper is the metal of invention." Revere makes not only several types of copper tube, but also other copper and copper alloy mill products, and will be delighted to collaborate with you in such matters as selection of the most suitable metal, and fabrication methods to be employed.

Revere copper tube as fabricated by Bryan for boiler use. It is explosion-proof, because should it give after long service, water and steam escape harmlessly. A new tube can be installed in a few minutes by anyone handy with tools.



• SAE holds its spring production clinic at Detroit . . . Atoms are being used successfully to test wear . . . British engineer looks at an American car . . . More details on the new Cadillac engine.



DETROIT — During a 3-day production clinic held here last week, the Society of Automotive Engineers took the postwar cars apart—piece by piece. Controversial subjects were prominent on the program, including design trends, new engines, frames v. frameless cars, gear design and production, possibilities of air-cooled engines and material handling.

As was bound to happen sooner or later, the atom popped up at the technical sessions when Messrs. Pinotti, Hull and McLaughlin of California Research Corp. presented a paper entitled, "Application of Radioactive Tracers to Improvement of Automotive Fuels, Lubricants and Engines." In this paper the authors reviewed the results of studies currently being made in which top piston rings, irradiated in an atomic pile at Oak Ridge, are tested to determine the rate of wear.

In conducting the tests, the investigators insert the radioactive rings in the top groove of the piston. After a short break-in run the crankcase is flushed and filled with fresh oil. The test is then run for a brief period of time under the desired conditions. Oil

samples are taken and the radiation activity is measured, using the familiar Geiger counter. The oil sample can be tested in a few minutes. The oil is then returned to the crankcase and the test is continued.

The piston rings are stored and shipped in a 300 lb lead box. They are never touched by human hands, even during assembly and disassembly of the engine. This operation, incidentally, has to be carefully planned so that the work is completed in a period of from 1 to 2 hr on a one-cylinder diesel engine. This schedule avoids dangerous exposure, according to the authors.

The test results thus far have been quite satisfactory from the standpoint of reproducibility; it is also reported that the time necessary to conduct a satisfactory wear test was reduced 99 pct. Replying to a question from the floor the authors explained that radioactivity can occur only in the piston ring itself, thus eliminating the possibility that wear in other parts of the engine will affect the results.

Looking ahead, these investigators suggested that similar techniques may eventually be used to test automobile engines for speed, load, oil temperature, jacket temperature, air fuel ratio and other variables. They also see the possibilities of making quickly critical tests on transmission, differentials and steering mechanisms.

A European Looks at American Automobiles

• • • Commenting upon the differences between American and European automobiles, Reid A. Railton, a British consulting engineer, pointed out that by comparison with European models, practically all American-built cars are luxury automobiles. Mr. Railton said that comparatively short runs on highways plus differences in the two economies made it impossible for the European designer to follow American engineering practices. Thus, differences in operating conditions account for many of the differ-

ences between American and European cars, he said. However, as Mr. Railton viewed the American cars, they leave something to be desired from the standpoint of steering, brakes, roadability and noise.

Mr. Railton argued, for example, that the low-geared steering makes American cars difficult for Europeans to handle on roads with sharp turns. Europeans, he said, don't feel quite safe at high speeds.

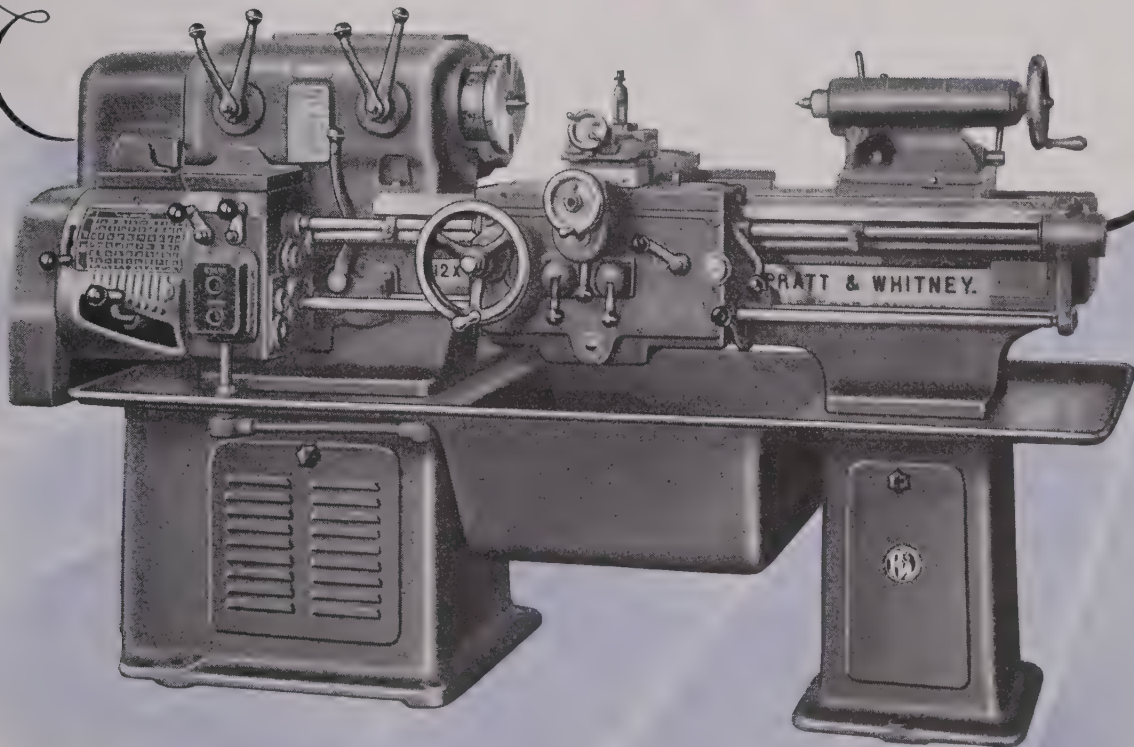
Replying to the Britisher's criticism, some of the American engineers pointed out that with so many women drivers in this country and so much driving being done over long straight roads with a heavy car, low-geared steering was mandatory.

Mr. Railton also suggested that American car designers may be favoring "Boulevard Ride" even at the expense of good handling characteristics. He said that many European engineers continue to view low pressure tires with some misgivings both because of their effect on handling the car and because there is some doubt in the European mind as to their safety under high speed driving conditions. (American engineers, however, seem to view the situation somewhat differently, the trend toward low pressure tires being, at the moment, very strong.)

European complaints about brakes, the speaker said, stem from the different road conditions in Europe and from the absolute necessity of hard driving to keep up a reasonable average speed on cross-country trips. In Europe, he said, ability to keep up a good average speed over all kinds of roads is highly prized. The speaker pointed out that in Switzerland, for example, it is normal procedure to descend a tortuous mountain pass in high gear, using the engine to accelerate on the straights and braking hard for each curve. This requires, he pointed out, larger and more expensive drums and shoes in all but the lightest cars. The brake pedal pressure is also necessarily increased, he said.

The speaker observed further that while the American motorist is much more tolerant of mechani-

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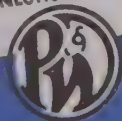
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LATHE**

cal noise than his European brother, "it is a fact he (the American) will put up with pronounced road noises, tire noises, and wind noises without apparently being aware of their existence." Europeans, Mr. Railton said, have been surprised to note how little has been done to combat road noises in America.

"The trend toward lower roofs, coupled with a steady reduction of mechanical noises, has brought the situation to a point where the road noises stick out like a sore thumb," he continued.

Concluding his remarks, Mr. Railton pointed out that while American cars are admirably suited to the majority of American conditions, they are not suitable to all conditions, particularly those characterized by narrow, twisty roads and rough surfaces over which it is desirable to maintain a fairly high rate of speed. The author felt that some of the performance characteristics which the Europeans are trying to get into their cars might be given serious consideration by the automobile designers in this country.

Gives Detailed History Of Cadillac Engine

Detroit

• • • One of the best documented and most ably presented discussions at the SAE sessions was the paper on the new Cadillac engine by H. F. Barr, staff engineer, and E. N. Cole, chief engineer, Cadillac Motor Car Div. of GM.

In this paper the authors give a detailed history of Cadillac engines covering a period of 33 years. They describe the experimental and development work preceding

the introduction of the new high compression powerplant in considerable detail. The paper contained a full discussion of considerations like roughness, compression ratios, fuel economy, weight, performance, connecting rods and valve and camshaft design.

Among a number of interesting facts about the Cadillac engine which are disclosed for the first time in the paper are the following:

- (1) The new slipper type pistons permitted a reduction in piston weight of 14 pct.
- (2) The Cadillac engine operating at 7.5 compression ratio requires fuels of 88 Research octane. By retarding the spark 84 octane gas can be used without appreciable loss in performance.
- (3) There has been a reduction of 220 lb in installed weight of the 1949 engine as compared with the 1948 model. Cylinder block and crank case weigh 112 lb less than the 1948 model. Crankshaft weight has been reduced 30 lb and the flywheel and ring gear weigh 16.8 lb less than the earlier engine. Camshaft and drive are 19.6 lb lighter.
- (4) At 4000 rpm engine frictional horsepower has been reduced 23 pct and heat losses to coolant were reduced 20 pct.
- (5) A 1949 Cadillac 62 equipped with Hydra-Matic transmission gave 16 miles per gal at 60 mph compared with 14 miles per gal for the 1948 engine.

The authors said that production costs of high octane gasoline,

technological progress by the petroleum industry, the desire to conserve material resources, the customers' insistence on more miles per gal and competition within the industry are the factors that will determine how rapidly Cadillac will raise its compression ratio up to a maximum of 12.5 to 1.

Morning and afternoon panel discussions were held covering the following subjects: materials handling; production and manufacturing control; gear design and production; preventive maintenance of plant equipment; inspection and quality controls; surface finish; recent development in heat treating processes; body steel and its treatment.

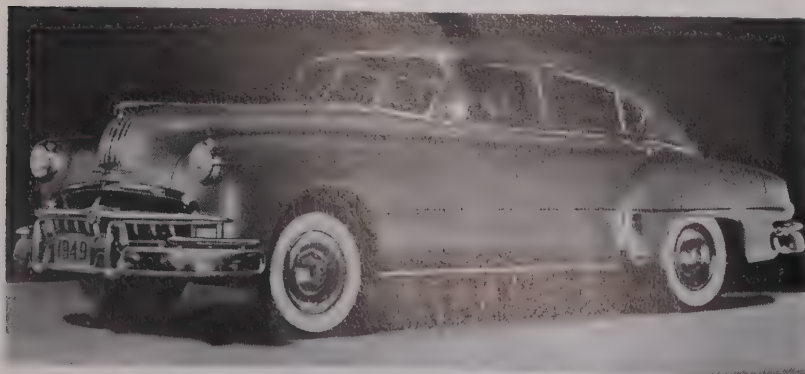
Frameless Body Repair Cost Not Excessive

Detroit

• • • Discussing the frameless car body before the SAE, Theodore Ulrich, chief body engineer, of Nash Motors, argued that from a survey made within the last 30 days the cost of repairs developed by leading insurance companies on Nash cars was comparable to that of other makes. Automobile insurance adjusters, he said, have reported that since no frame straightening is required on a unitized body and repairs can be effected through sectional replacements or replacement of a portion of a section, there are instances where the cost of repairs of the unitized body is actually less than a car of conventional make with similar damage.

Another point of view of the frame v. frameless body was presented by D. W. Sherman, chief engineer of A. O. Smith Corp. In summarizing, the speaker said that the difference in weight between the frameless car and a car with separate frame will not be nearly as great as some persons may have expected. He also argued that development expense favors the car with the frame rather than the frameless car. He predicted that between cars with and without frames, the cost differential can well be in favor of the frame car. The speaker also said that in the case of the convertible, "We know no way to secure a really good one without the use of a heavy and efficient "X" member, suitably tied into the structure."

SILVER STREAK FOR '49: The 1949 Pontiac 4-door Streamliner is one of the two basic body styles included in the new Pontiac line. Lower hoods, curved windshields, postwar fender styling and low pressure tires are featured in these latest additions to the GM line.



BUILT TO MOVE GOODS—

NOT DEADWEIGHT



The weight's in the load and not in the truck when frames, body panels, fenders, wheels and other truck structural parts are made of N-A-X HIGH-TENSILE. And while affording weight savings of up to 25% in section, the high physical properties of N-A-X HIGH-TENSILE insure superior strength and increased resistance to fatigue, corrosion, abrasion and denting.

This decrease in deadweight decreases on-the-job expenses, too. Trucks built with N-A-X HIGH-TENSILE consume less gasoline . . . require less maintenance . . . give longer service. And the excellent formability, weldability, and fine surface texture of N-A-X HIGH-TENSILE mean that you build them better, with no added fabricating problems.



GREAT LAKES STEEL CORPORATION

N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN
Unit of National Steel Corporation

• End of farm equipment shortages expected in 1949 but few factory cut-backs seen . . . Will need 2 million tons of steel for sustained high output.



WASHINGTON—Farm machinery output this year is expected to pretty much follow the same pattern now predicted for most steel-consuming industries, according to a comprehensive study by the Commerce Dept.

Briefly, according to the Commerce survey, a general balancing of supply with demand may be expected by the end of 1949, depending primarily upon the supply of steel.

Again as forecast for other steel-consuming industries, there is no indication of falling off of business or serious cut-backs in overall manufacture. Production is currently running at about three times the prewar level and the industry shipped out about \$2 billion worth during 1948. This level is expected to be maintained throughout this year.

If the steel is available from mills and other regular sources, manufacturers expect to beat about 1,800,000 tons into plowshares and other farm goods. But if they have to go behind the

barn to get their steel, that is another matter. They may carry some of the orders over into next year.

Now that steel demand is easing, makers of farm machinery and equipment are making it plain that they want no more trucks with conversion and gray market steel. They have had enough of that. Many in the industry, especially the smaller and newer firms, have had to buy such steel in the past in order to keep going or to fill the most pressing orders.

It is reliably estimated that at least a sixth—or more than 300,000 tons—of the industry's total steel consumption last year was purchased from such sources.

Manufacturers can now afford to turn thumbs down on offers of all premium-priced steel which tends to hold up prices of the end product. Backlogs for some items have been wiped from the slate and the market for some others is down. But a sustained demand for major items of labor-saving farm equipment more than takes up the slack and it is easier to stretch out production in hope of free-market steel.

STILL in short supply are such items as tractors, tractor accessories such as gang plows and cultivators, combines and harvesters, picking machines and so on. This offers a prop to the market. While the domestic market for many items will continue to decrease this year, the Office of Domestic Commerce forecasts a strong, continued export market. Last year, foreign business amounted to \$365 million or about 15 pct of total production.

Paradoxically, the United States has been exporting farm machinery on one hand and importing on the other—imports during 1948 more than doubling those of 1947. Some \$81 million worth were brought in last year.

However, this was something of a horse-trading arrangement. A

large proportion of the imports were tractors from the United Kingdom and combines and harvesters from Canada, both of which are in short supply in this country. Tractor imports from Britain are expected to be substantially reduced before the end of this year.

Seven of the larger firms within the industry produce about 60-65 pct of the total agricultural equipment output, according to the Dept. of Commerce. These generally concentrate on manufacture of equipment used in the growing and harvesting of the so-called major crops.

This leaves the field wide open to some 1600 smaller firms for the production of general types of farm equipment. Like their bigger counterparts, some specialize in certain types of machinery and others produce only special purpose lines such as sprayers. Still a third group confines its activities to manufacture of parts.

Although the need is softening for several types of equipment, the overall market is still strong. Low wartime production and postwar strikes, plus a huge postwar foreign need, combined to build up a broad demand. Still another strong factor has been a postwar record high farm income.

Despite Reuben's cries that the high cost of equipment is sending him to the poorhouse, no less an authority than the Commerce Dept. says that his costs for equipment haven't risen either as fast or as high proportionately as his income.

FARMERS now have the buying power to not only replace obsolete and worn-out machinery, but to buy new and improved equipment which they previously could not afford. Also, buying of more labor-saving machinery has been forced upon them by a strong industrial labor market which, to some extent, has lured the farmhands by offers of higher wages and shorter hours. The govern-

More speed, lower cost with HOBART A.C. welding

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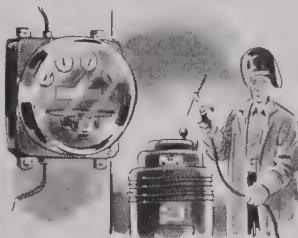
More welding speed in manual or automatic production operations. Extra large electrodes can be used in high welding currents. Instant starting arc is steady and easy to hold.



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Low current cost with low no-load input and higher efficiency at full load. Multiple unit capacitors guarantee best Power Factor at full rated loads.

These, plus other HOBART advantages of superior design and quality construction, mean more arc welding value per dollar invested.

Made in 300 amp. and 500 amp. sizes, these Industrial Transformer Welders are especially built for shop and factory use. Other Hobart welders, A.C. or D.C.—are available in the largest, most complete line on the market.

Use the coupon to get more facts, then compare. Comparison will show you how to get better results, greater economy, with Arc Welders built by Hobart Brothers Company, Box 1A-39, Troy, Ohio.

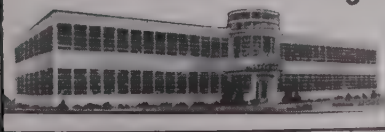
REMEMBER . . . It's better to have bought a HOBART than to wish you had.



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This non-profit institution offers modern courses in welding all types of metals. Approved by leading State and Federal educational authorities and qualified by Government for Service Veterans. Write today for the complete details.

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FREE A Guide to Better Welding. Has new ideas on how to do a better welding job.

ment's price support program guarantees this relatively good buying position to the farmer.

After a survey of the industry, the Office of Domestic Commerce summarizes its findings in regard to the major items in more critical supply about as follows:

Wheel Tractors. Production during 1948 is estimated at about 525,000 units, of which all but 75,000 were sold to domestic users. About 24,000 more were imported to help meet domestic needs. Overall 1949 production will remain about the present level, with a probable shift in tractor sizes. Small 1-plow types have caught up with demand and larger 1-plow and 2-plow sizes are rapidly doing so. There is a continued shortage of the 3-plow and larger types.

Track-laying Tractors. Demand is seen as continuing strong for this type, particularly in view of heavy foreign demand which absorbed more than a quarter of the 42,000 manufactured last year. Only about a third of current production goes into farm use, but indications are that foreign demand could still take all present American production.

Combines. Demand and supply should nearly balance by the end of the year if 1948 production of 90,000 units is equaled. Biggest need is for larger sizes. Exports of 11,850 compared with imports of 10,300 units.

Corn Pickers. Despite price drops in commodity markets, demand for these machines remains strong because of the cost and scarcity of farm labor. Production schedules indicate a larger output than last year when 80,000 units were made. Demand is still greater than supply.

Pick-up Balers and Side-delivery Rakes. The latter are necessary to operation of the baler, a relatively new development. Production of neither has been able to keep up with demand, but backlog orders should disappear during 1949.

Tractor Plows and Cultivators. Supply has lagged, largely because of lack of pig iron for plow moldboards and spring steel for the cultivators. With more pig iron and steel in sight, supply should catch up with demand in early 1950.

Civilians to Direct Industrial Affairs Of Munitions Board

Washington

• • • Representatives of industry will have a stronger voice in the Munitions Board's mobilization planning under an organizational shift made by chairman Donald F. Carpenter. The action is in line with recommendations made by the Hoover Commission.

Formerly, industrialists on duty with the board were subordinate to the military. Under the new plan, civilians with industrial experience will head and direct those activities which have to do largely with industrial affairs. Military aides will assist them.

Top civilian position under the new arrangement will be Director for Industrial Programs—which include industrial production planning, stockpiling, construction and manpower. Major General Sidney P. Spalding will be the acting director until a civilian is named, after which he will become military adviser.

First steps have already been taken in the new alignment of duties. Harry E. Blythe has been named to head up industrial mobilization planning work and J. Clawson Roop as deputy chairman of the Committee on Facilities and Services.

A one-time vice-president and general manager of Goodyear, Mr. Blythe more recently was president of the Buffalo Weaving & Belting Co. and the Galanot Products Co. Mr. Roop is a former vice-president and treasurer of Pan-American Airways.

Small Businesses Share

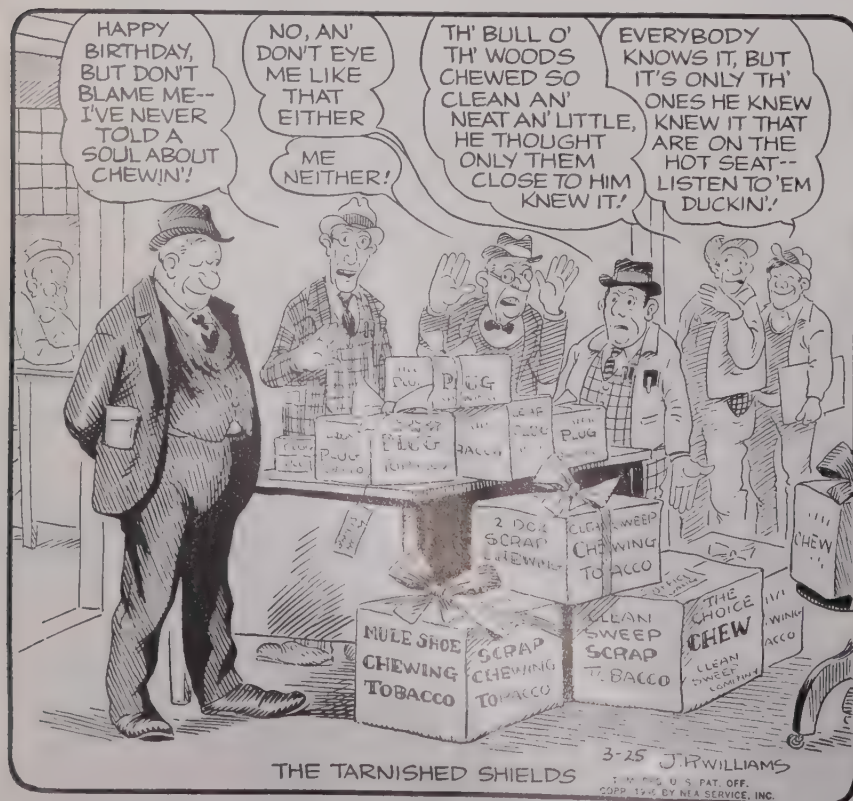
Washington

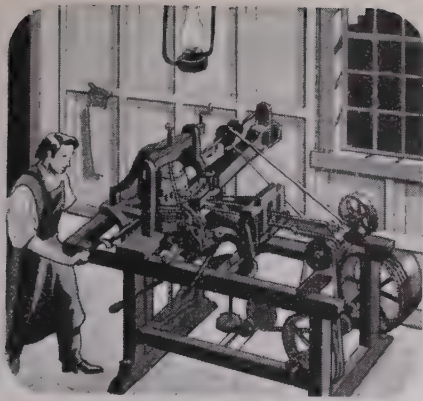
• • • During the period from May 19, 1948, to Jan. 31, 1949, 69 pct of all naval contracts representing 31 pct of the total dollar value was let to the nation's small businesses, according to a Navy Dept. announcement.

Of a total number of 358,732 business transactions, the Navy let to small business 246,067 contracts with a dollar value of \$317,358,073. The dollar value of all naval business transacted during this period was \$1,016,735,484.

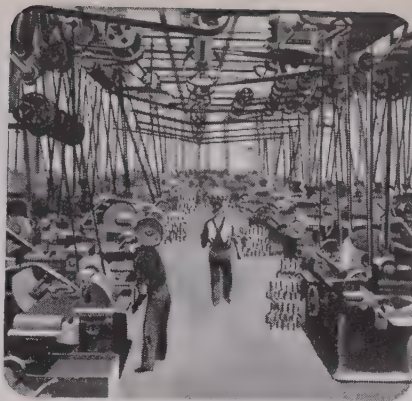
THE BULL OF THE WOODS

BY J. R. WILLIAMS





1 1865—Here's how machines looked before man applied electricity for industrial usage. Gear setups were crude. Making parts fit was a matter of luck and plenty of tinkering by operators.



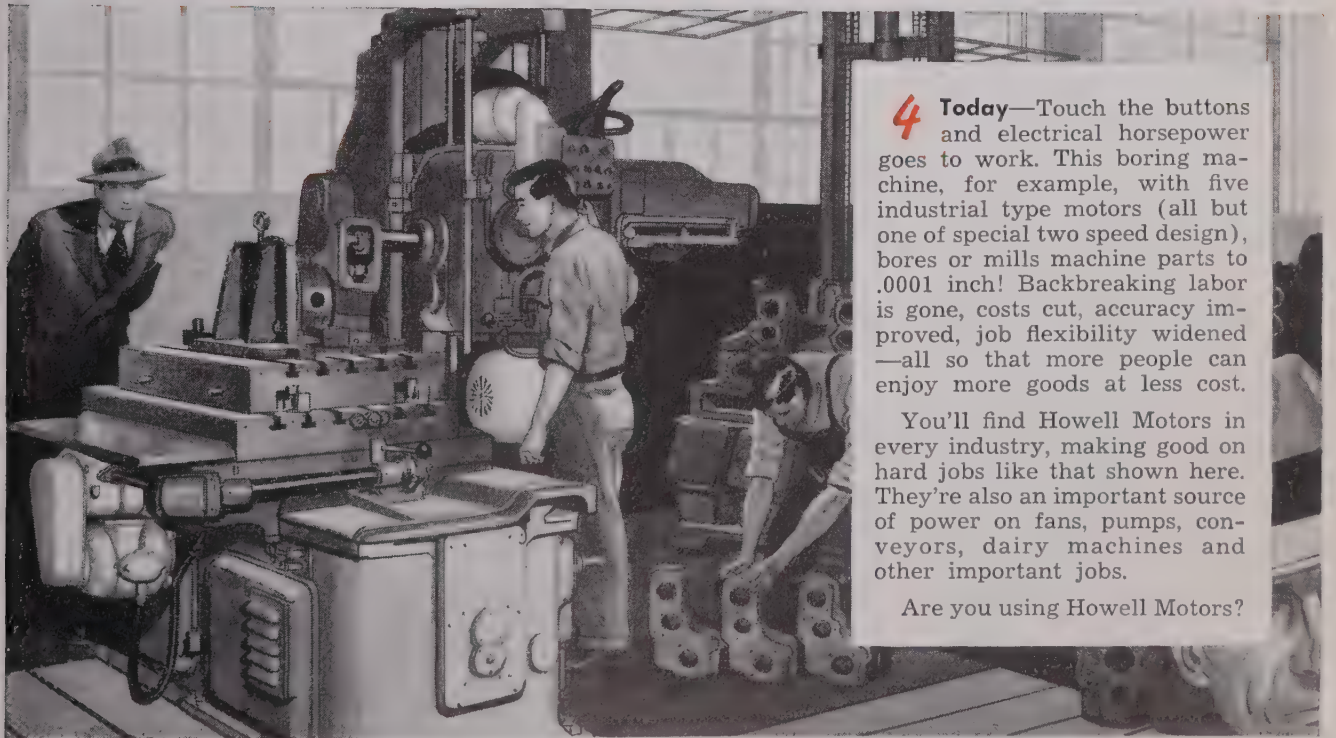
2 1907—Electrical horsepower gave production a big boost. But gear mechanisms were far too cumbersome. Repairs were frequent. Men were still struggling to make one motor do the work of many...



3 1915—Howell "Red Band" Electric Motors arrived. These rugged, industrial type motors were specially designed to withstand hard usage. Soon, Howell Motors appeared in this and other industries.

NOW, IT'S TOUCH AND GO!

(and parts are machined quicker and to closer tolerances)



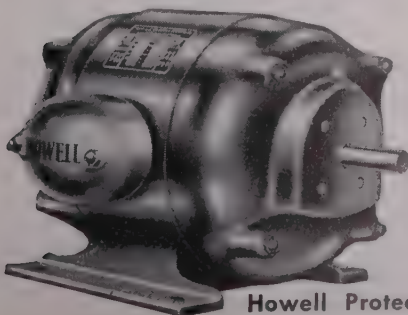
4 Today—Touch the buttons and electrical horsepower goes to work. This boring machine, for example, with five industrial type motors (all but one of special two speed design), bores or mills machine parts to .0001 inch! Backbreaking labor is gone, costs cut, accuracy improved, job flexibility widened—all so that more people can enjoy more goods at less cost.

You'll find Howell Motors in every industry, making good on hard jobs like that shown here. They're also an important source of power on fans, pumps, conveyors, dairy machines and other important jobs.

Are you using Howell Motors?

Free enterprise encourages mass production, supplies more jobs—provides more goods for more people at less cost.

Here's another precision-built Howell Motor... industrial type with copper or bronze bar rotors... specially insulated... statically and dynamically balanced.



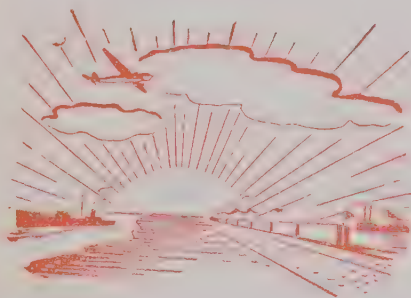
Howell Protected Type Motor

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Manufacturers of Quality Industrial Type Motors Since 1915

• Copper and copper alloy products manufacturers strengthening position in West . . . Utah resources escape threatened tax . . . Ship repair aids Northwest yards.



LOS ANGELES—Following the lead of the steel industry in enlarging western production facilities, major manufacturers of copper and copper alloy products are taking a firm foothold in the area with indications that southern California will become a basic center for these products second only to upper New York and New England.

The second major company in the field, Revere Copper & Brass, Inc., this week was completing trial runs and making final preparations for start of production in a plant in Maywood, near Los Angeles, to produce copper and brass tubing and rods.

Pioneer in the West has been Phelps-Dodge Copper Products Co., also in Maywood. This company came into southern California in 1942 to operate a government plant under wartime conditions. Since the war, it has remained successfully in full production.

To complete the newly competitive field, American Brass Co. this month announced purchase of a 45-acre tract for construction of a multimillion dollar plant in Los Angeles which may be even larger than that of Revere or Phelps-Dodge.

Although all of the companies are very close-mouthed, increased

transportation costs and the great postwar industrial growth of the West are believed to be the primary factors in the expansion programs. Whatever the reason, it means the automobile, electrical, aircraft, power, refineries, marine, building and other industries will have greater accessibility to supplies of copper and brass fitted to their needs.

Although American Brass has announced no definite plans, it is expected to follow the program of Revere and Phelps-Dodge in shipping refined ingots here for processing and rolling. One of the largest refineries is in El Paso, Tex., and there are smelting companies ready to deliver from the Salt Lake area.

Phelps-Dodge has limited itself to producing tubing thus far. It has serviced from its southern California plant many of the large refineries, marine companies and power companies with condenser tubes. It makes tubing of various copper alloys. Some of it also serves refrigerator, aircraft and home building industries. Los Angeles which produced more homes than any other section of the country during 1948, has offered a particularly inviting market in this latter field.

In the 12-acre plant tubing is produced by extrusion and by cold drawing processes. It ranges from 3/16th of an inch in diameter upward.

Although they still appear to be going at full blast, some officials in copper and brass companies have hinted a slight decline in the western sales market.

No actual tonnage figures are available, however. The tonnage is known to have increased tremendously in the western market since Phelps-Dodge moved here in 1942.

Revere has had some difficulty with final details of its plant and some work still is being done on it by the contractors although offices had been opened there earlier. When producing, it will add rods to the tubing line here.

Tentative plans announced by A. H. Quigley, president of American Brass, indicate that the firm will go even further and turn out sheets and wire in addition to rods and tubes. Complete costs for the new plant have not been announced but some guesses place it above \$10 million.

Plant Conversion Stalled

Salt Lake City

• • • J. R. Simplot Co. is apparently stymied in conversion of the war surplus Kalunite plant to production of fertilizer by inability to get anhydrous ammonia.

Turned down by Secretary of Commerce on his application for an allotment from the army plant in Texas (only source of supply), Mr. Simplot carried his case to the department's appeals board and that board has now rejected the appeal.

Utah Resources Escape Severance Tax Bill

Salt Lake City

• • • Natural resource industries in Utah drew a sigh of relief when the 28th state legislature adjourned without bringing a severance tax bill to a vote in either house. The proposed bill would have levied a tax ranging from 5 to 8 pct on net, the graduation being on a basis of the ratio of net to gross.

The only tax change affecting the steel industry (other than some increases in property tax ceilings at the local level) was a clarification of the state's 1 pct mine occupation tax and the net proceeds valuation tax, as applied to iron ore production.

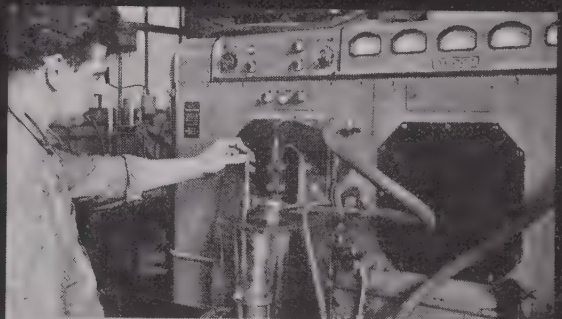
Under the net proceeds tax, twice net proceeds is used to determine the valuation for property tax purposes.

Last year the tax commission ran into a snag because of the wide variation in the selling prices of ore. Some ore, for example, was

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Progressive engineers at Lima-Hamilton Corporation recently adopted TOCCO Induction Heating for the hardening of bearing areas on this slide pin used in famous Lima Power Shovels. Your part may be very different but if it has to be hardened, soldered, brazed, annealed or forged TOCCO probably can cut your costs and improve your products, too.

CUTS COSTS Formerly this pin was carburized and hardened all over by conventional heating methods. Distortion was such that each part had to be straightened and then centerless ground to close limits. Rejects often ran 25% to 30%. TOCCO heats just the bearing areas that require hardening—result, no distortion, no final grinding, no rejects and 9¢ saved on each part. Production is 410 pieces per hour.

VERSATILITY, TOO In addition to the pin shown above, Lima hardens 138 other parts ranging from small screws to large gears—all on the same TOCCO machine. Between production hardening jobs, the machine is used for brazing carbide tips on cutting tools—some 10,000 during 1948. TOCCO engineers will gladly survey your plant to determine where TOCCO can cut your costs, speed-up your production, without obligation, of course.

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sold for more than twice as much as the price charged by Columbia Iron Mining Co. to its sister subsidiary—Geneva Steel Co.—and the Kaiser-Frazer Parts Co., operator of the war surplus blast furnace at Iron-ton. The tax commission undertook to arbitrarily fix a price on Columbia Iron Mining Co.'s ore in line with the other sales. The commission's power to do this was challenged and the case is now in the State Supreme Court. The legislature passed two bills authorizing the tax commission to fix a fair value on iron ore when sold under contract between two subsidiaries of the same company. The industry raised no objections.

Conversion Contracts Aid West Coast Shipyards

Seattle

••• Although West Coast shipyards aren't too optimistic over the prospects of getting construction contracts, they are not ungrateful for the bits and pieces of business coming their way in the form of conversion and repair.

Todd Shipyard here has been awarded its third contract for conversion of a C-3 type transport into a merchant marine carrier. The latest contract was for work on the *Sea Runner* and will amount to approximately \$700,000. The company already is converting the *Sea Star* and the *Sea Flier* at a total cost of \$1.5 million.

No new hirings are anticipated to take care of work on the new conversion job but instead the presently enlarged crew will carry through for an extended period.

This yard also made the low bid of \$537,643 for the conversion of a

5000-ton freighter for use by the Alaska Native Service.

All Seattle shipyards are watching the labor situation as the "master agreement" which has been the bulwark of labor stability within the years since 1940 is being threatened. One union is preparing to withdraw and is reportedly willing to strike if necessary to protect its jurisdiction.

Withdrawal action has been taken by Local 79, Machinists Union, which has jurisdiction over all machinists employed in the Seattle area shipyards. I. A. Sandvigen, business agent for the local, said the action might cause a challenge of the union's jurisdiction, but added that they were prepared to meet the challenge.

Since the start of the national defense program in 1949 shipyard contracts have been negotiated on a coastwide basis by the Pacific Coast Metal Trades Council, of which the Seattle Metal Trades Council is a part.

Mr. Sandvigen gave his reason for withdrawal of the machinists as lack of voice in the Seattle Metal Trades Council. His machinists will insist on negotiating separately until such time as they may be reaffiliated with the Council it is reported. The machinists were expelled from the Trade group in 1946, following the withdrawal of the International Assn. of Machinists from the AFL. According to Mr. Sandvigen machinists in other regions are still affiliated with their local Metal Trades Councils.

M. E. McLaren, secretary for the Seattle Metal Trades Council, states that his group has no comment to make at this time about the machinists' notice of withdrawal.

Reports Its Western Plant Unaffected By Industrial Recession

San Francisco

••• Whatever recession industry in general may be passing through, as yet it has not affected the 2 year old plant of Westinghouse Electric Corp. at Sunnyvale, 40 miles south of here.

This 57-acre plant located in the Santa Clara Valley, was formerly owned by the Joshua Hendy Co., which during the war produced components for the gigantic western shipbuilding operations and was considered one of the finest equipped machine shops on the Coast. At present Westinghouse is consuming approximately 500 tons of all types of rolled steel per month in addition to about 100 tons of steel and iron castings in the production of steam turbines, voltage regulators, motors, power and distribution transformers, other miscellaneous electrical controls and home water heaters.

This is the sixth largest of Westinghouse's 38 odd plants and is the only one in which all of the above products are produced, and now employs approximately 2500 men and women. Total employment of Westinghouse on the Pacific Coast is at the present time approximately 4000 with a total monthly payroll of \$1,260,000. Approximately \$1,400,000 is spent each month on the Pacific Coast for raw materials including a considerable portion of their steel requirements.



ALUMINUM FOIL: Permanente Metals Corp.'s \$1,500,000 aluminum foil mill occupies buildings (in the foreground) that were part of Permanente's former magnesium plant at Permanente, Calif. The mill is expected to turn out 5 million lbs of foil annually in widths up to 30 in. and thicknesses from 0.00025 to 0.005".

P&H



HERE'S P&H LEADERSHIP AGAIN... *Magnetorque AC Crane Control*

The new Magnetorque Control for AC Cranes is another outstanding example of P&H's leadership. . . . It exerts braking forces electro-magnetically — without friction — without wear. It provides the smoothest, most accurate control ever put on an Overhead Crane . . . under all load conditions. It eliminates the old mechanical load brake and all the maintenance that goes with it. And it does all this with the convenience of existing AC power supply.

Wise crane buyers are not missing the advantages of the Magnetorque. It is but one of many P&H Added Values.



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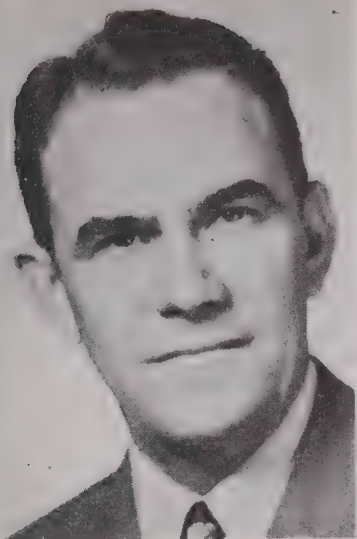
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CORPORATION



MAGNETORQUE
CRANE CONTROL
is another P&H
Added Value.

OVER 16,000 P&H CRANES SERVE AMERICAN INDUSTRY . . . FAR MORE THAN ANY OTHER

PERSONALS



HERMAN H. VAUGHN, assistant treasurer, National Supply Co.

• **Herman H. Vaughn** has been elected assistant treasurer of the National Supply Co., Pittsburgh, with his headquarters in Fort Worth, Texas. Mr. Vaughn joined National Supply in 1944, and previous to his new appointment, had served as credit manager of the company's Texas division.

• **Melvin C. Harris** has resigned as vice-president in charge of production, Allegheny Ludlum Steel Corp., Pittsburgh. Pending the election of his successor, **C. B. Pollock**, production manager, is in charge of production for the company. Mr. Harris joined the company in 1915 and later served as plant manager and manager of production. He was elected a vice-president in 1946. Mr. Pollock has been associated with Allegheny-Ludlum since 1932. He has been manager of production since 1946.

• **Earl P. Dubois** has been appointed manager of sheet sales for Great Lakes Steel Corp., Ecorse, Mich. Mr. Dubois had formerly been associated with Briggs Mfg. Co.

• **V. W. Blackney** has been made assistant to the president of U. S. Radiator Corp., Detroit. **J. Roy Knox** has been appointed general manager of sales.

• **Siegfried Stern**, president, has been elected chairman of Multi-Metal Wire Cloth Co., Inc., New York.

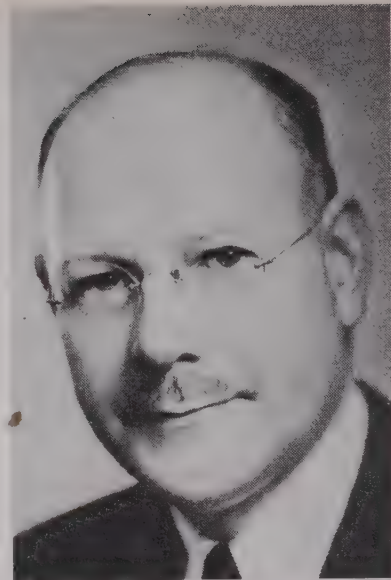
• **Edmund Pfeifer**, a member of the Coatesville, Pa., district sales staff of Lukens Steel Co., becomes assistant district manager of sales of the Boston office of the company, effective April 1. He has been associated with the company since 1939. **Charles H. Pyle** has been named to handle the territory formerly covered by Mr. Pfeifer, in York and vicinity, continuing to operate out of the Coatesville district sales office. Mr. Pyle started in a plant of By-Products Steel Co., a division of Lukens, and in 1946 was named a sales engineer of the Coatesville district sales office. **Harry T. Galloway** has been appointed superintendent of the Strode Ave. plant of By-Products Steel Co., succeeding **Howard G. Rudisill**, who died. Mr. Galloway has been associated with Lukens since 1927. In 1945 he was named assistant superintendent of the Stode Ave. plant.

• **Edward Elliott** has been named manager of the New York district, Pressed Steel Tank Co., Milwaukee. Mr. Elliott had previously managed the company's Cleveland territory, and he is succeeded there by **T. V. Montgomery**.

• **W. B. Osgood** has been named a partner in the firm of Dunbar Engineering Co., engineering representatives of Edward Valves, Inc., a subsidiary of Rockwell Mfg. Co., East Chicago, Ind. Mr. Osgood formerly served as New York district representative of National Tube Co.

• **Edward Norris** has been elected chairman of the board and **W. V. Daugherty**, president of the Utica Drop Forge & Tool Corp., Utica, N. Y. Mr. Norris had been president of the corporation since 1937 and had previously served in the same capacity at Utica Heater Co. Mr. Daugherty had formerly served as vice-president. He has been associated with Drop Forge since 1944.

• **John W. Carpenter** has resigned as chairman of the board of directors of Lone Star Steel Co., Dallas.



VINCENT deP. GOUBEAU, vice-president, RCA Victor Div., Radio Corp. of America.

• **Vincent deP. Goubeau**, who joined the RCA Victor Div., Radio Corp. of America as director of materials in 1945, has been elected vice-president in charge of the Materials Dept. of that division.

• **Levi W. Reeves** has been appointed assistant manager of sales, Memphis district sales office of Tennessee Coal, Iron & Railroad Co., Birmingham.

• **W. H. Seaman**, president of National Roll & Foundry Co., Pittsburgh, has been elected chairman of the board of directors. **Robert Logie**, treasurer has been elected executive vice-president. **Frank C. Nash** and **Nolan P. Benner, Jr.** have been named secretary and assistant secretary, respectively.

• **Harold F. Stone** has been named head of the chemical engineering department of Sam Tour & Co., Inc., New York.

• **Charles DeZutter** has been appointed superintendent of the bessemer finishing and rolling mills for Republic Steel Co., Youngstown, and **E. H. Callahan**, assistant superintendent. **Charles R. Leonard** has been appointed assistant superintendent of the electrical department.

• **Jack Scott** has resigned as sales manager of the Ernst Iron Works, Buffalo, to become sales executive of an automobile agency in Buffalo.

Longer Die Life

Less "Downtime" of Equipment

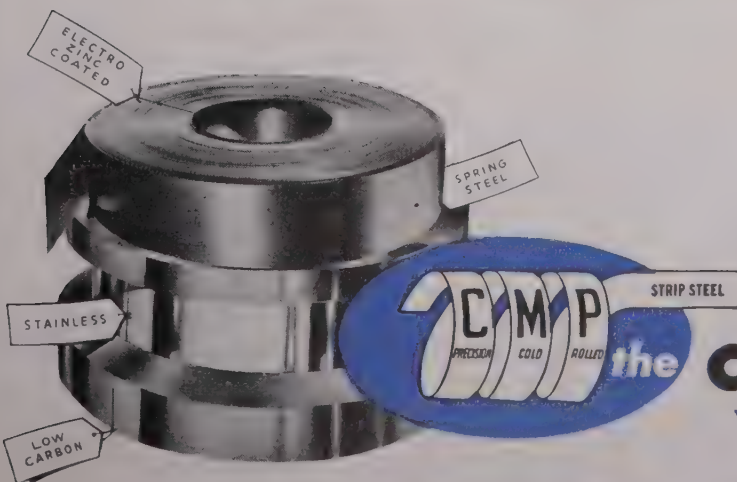
15% More Finished Parts Per Ton

CMP



CUSTOMER SAVINGS REPORT

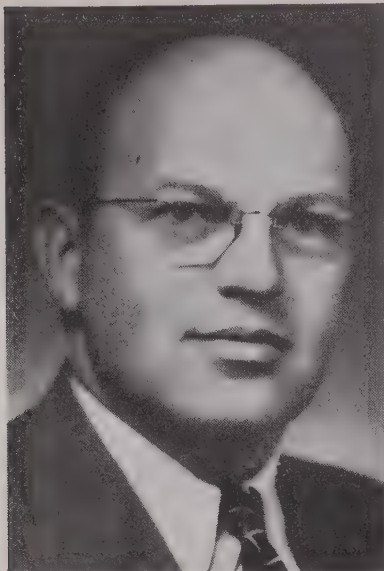
Just another case where a CMP customer had the opportunity to double check the savings Thinsteel provides. Equal tonnage of precision rolled Thinsteel and the competitive steel were compared on normal and identical production runs . . . the cost saving facts are headlined above. It's typical of Thinsteel customers' reports in our file. So when you are planning product improvement and want to keep costs competitively right it would be worth checking Thinsteel availabilities. Your inquiry will bring interested attention from this pioneer in precision cold rolling.



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THE IRON AGE, March 24, 1949—111



JUDSON G. HYDE, comptroller, Sperry Products, Inc.

• **Judson G. Hyde** has been named comptroller of Sperry Products, Inc., Danbury, Conn. Mr. Hyde had formerly been resident manager of the Stamford, Conn., office of Hadfield, Rothwell, Soule & Coates.

• **Ralph H. Lott** has been appointed coordinator of sales, **Arthur J. Schneider**, general sales manager and **William F. Schlick** has been made district manager of the Chicago branch, all at the Sterling grinding wheel division of Cleveland Quarries Co., Tiffin, Ohio. Mr. Lott joined the company in 1904 and had formerly been district manager of the Chicago office. Mr. Schneider joined the organization in 1934 and had previously been assistant sales manager. Mr. Schlick has been with the company since 1944 and had, previous to his new appointment, served as a member of the sales organization in Cleveland.

• **George N. Decker** has been named comptroller of the Kellogg Div., American Brake Shoe Co., New York. Mr. Decker has been with Brake Shoe since 1944 as assistant comptroller of the Kellogg Div. He is located at the division's headquarters in Rochester, N. Y.

• **G. H. Duff** has been appointed manager of the Peoria, Ill., office of Westinghouse Electric Corp.

• **Donald N. Hildebrand** has been named assistant superintendent of the continuous tube mills, Republic Steel Corp., Youngstown, succeeding Roy Case.

• **William F. Dannecker** has been named assistant to the superintendent of the blast furnace at the Hamilton, Ohio, plant of Armco Steel Corp., Middletown, Ohio. **Norman R. Trisler** has been appointed general foreman, electric melting department. **James S. Miller** has been appointed instructor in the training section of the personal relations department.

• **W. C. Keeran** has been elected vice-president in charge of manufacturing operations, Roth Mfg. Co., Chicago. Mr. Keeran joined the company in 1941 and was made manager of production in 1946.

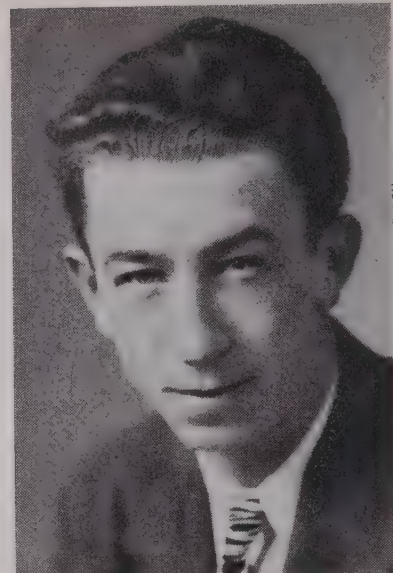
• **James P. Pegnem** has been appointed secretary of Federal Drop Forge Co., Lansing, Mich., succeeding **L. S. Griswold**, who died.

• **Robert E. O'Brien** has been appointed district representative in the Cleveland territory for Hepenstall Co., Pittsburgh, replacing **Jack R. Allen**, who is leaving the company. Mr. O'Brien has been with the company since 1945 and had previously been connected with Bethlehem Steel Co., Inc., and Jones & Laughlin Steel Corp.

• **Robert W. Desing** has been appointed assistant director of industrial relations, Budd Co., Philadelphia. **Harper Adams** has been named personnel manager at the Hunting Park plant and **Elwood Stirling** has been appointed assistant personnel manager at the same plant.

• **C. S. McIntyre, III**, has been named service manager for Monroe Auto Equipment Co., Monroe, Mich. Mr. McIntyre has served for the past year with the Newgren Co., Butler, Pa.

• **Victor Roberts** has been named mechanical supervisor of the tin shop for the manufactured products division of the Borden Co., New York, succeeding **John H. Young**, who has been assigned to special work.



HAROLD T. CHESTER, tramway sales engineer, American Steel & Wire Co.

• **Harold T. Chester** has been appointed tramway sales engineer, American Steel & Wire Co., Cleveland, succeeding **William C. Kuhn**, who has retired after 44 years with the Wire company's tramway activity. Mr. Chester joined American Steel & Wire Co. in 1947 as assistant to Mr. Kuhn, and served in the field in the construction of several tramways. In his capacity as tramway sales engineer, he serves as sales consultant on tramway negotiations here and abroad.

• **H. C. Peters** has been appointed technical consultant of construction equipment, Blaw-Knox Co., Pittsburgh. He had formerly served as vice-president in charge of engineering for T. L. Smith Co., Milwaukee.

• **Frank E. Whyte** has been appointed manager of purchasing for the Carborundum Co., Niagara Falls, N. Y. Mr. Whyte had previously served as director of purchases for Pennsylvania Rubber Co.

• **Joseph B. Ely** has been elected a director of the Torrington Co., Torrington, Conn., succeeding **William E. Gilbert**, who died.

• **John F. Widder** has been named sales manager of Bolens Products division, Food Machinery & Chemical Corp., Port Washington, Wis. He had formerly served as assistant sales manager.



HAROLD S. DUNN, general sales manager, Harbison-Walker Refractories Co.

• **Harold S. Dunn** has been appointed general sales manager, Harbison-Walker Refractories Co., Pittsburgh. Mr. Dunn has been Pittsburgh district sales manager since last year, when he was promoted from sales manager of the Portsmouth, Ohio, district.

• **Dennis E. Tiberliis** has been appointed director of sales for Drake America Corp., New York, supervising activity of the export and import divisions of Drake America and the Hill Diesel Engine division. Mr. Tiberliis joined Drake America in 1947 as export manager.

• **Charles Morrison** has been appointed general manager of Benton Harbor Malleable Industries, Benton Harbor, Mich.

• **Edward L. Fortin** and **James Kniveton** have been elected vice-presidents of Selas Corp. of America, Philadelphia. Both men have been in the organization many years. Mr. Fortin also continues as treasurer, in addition to his new duties. Mr. Kniveton, an engineer, assumes greater responsibilities.

• **P. A. Thompson** has been named products supervisor in the Vessels division of A. O. Smith Corp., Milwaukee. Previously Mr. Thompson had spent 18 years with the Alco Products division of American Locomotive Co.

• **R. B. Crean** has been appointed manager of the new Diesel renewal parts department of Baldwin Locomotive Works, Philadelphia.

• **W. F. Emery** has been appointed district manager of the Detroit office of the Bristol Co., Waterbury, Conn. He has been in the Detroit office since 1926 as a sales engineer.

• **Walter F. Benning** has been appointed chief engineer of Willys-Overland Motors, Toledo, and **Philip C. Johnson**, has been named assistant chief engineer. Mr. Benning joined Willys-Overland in 1944 and has been technical assistant to the vice-president in charge of engineering for the past two years. Mr. Johnson has been with Willys-Overland since 1937 and for the past four years has been assistant to the vice-president in charge of engineering, directing departmental administration, labor relations and experimental production.

• **Vernon H. Olson** has been appointed general sales manager for W. O. Barnes Co., Inc., Detroit. Mr. Olson had formerly been works manager for the DoAll Co.

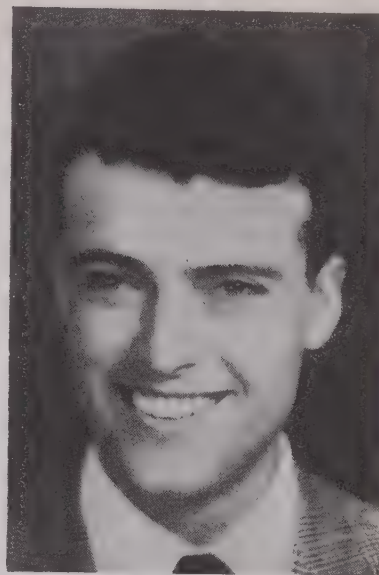
• **Morris A. Steinberg** has been appointed head of the metallurgical division of Horizons, Inc., Princeton, N. J.

• **W. A. Green** has been named manager of special accounts sales in the Associated Lines Sales division of the B. F. Goodrich Co., Akron, Ohio. Mr. Green has been with the company 23 years. He has been field division manager of sales to oil companies since 1942.

• **Francis P. Richardson** has been named to the newly-created position of assistant credit manager of the National Gypsum Co., Buffalo.

• **Hanford Haynes** has been placed in charge of the new sales office in Seattle for Consolidated Western Steel Corp.

• **George G. Raymond, Jr.** has been elected vice-president of the Lyon-Raymond Corp., Greene, N. Y. He had formerly served as sales manager.



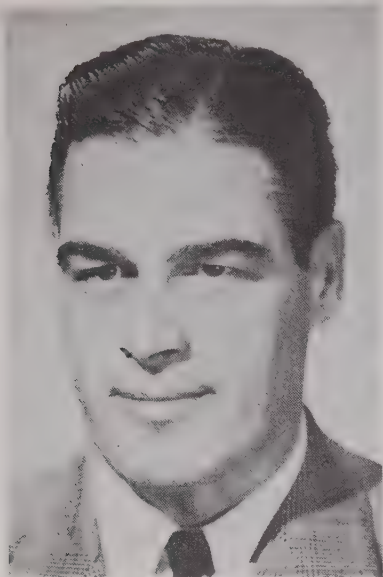
FRANK A. DEPATIE, manager, service department, Parker Appliance Co.

• **Frank A. Depatie** has been appointed manager of the newly-established service department of the Parker Appliance Co., Cleveland. Previous to his connection with Parker, Mr. Depatie served as petroleum engineer in the Venezuelan operations of the Standard Oil Co. of N. J.

• **A. C. Moore** has been named vice-president, manufacturing, for Ford International, Inc. Mr. Moore resigned as factory manager for the Plymouth Motor Div. of the Chrysler Corp. to join Ford. He had been associated with Chrysler since 1943. **Harold E. Jones** has been named vice-president-supply, of Ford International. Mr. Jones had formerly been associated with Willys-Overland and Chrysler Corp.

• **Bruce L. Bailey** has been made assistant general manager of the electrode division of Great Lakes Carbon Corp., Niagara Falls, N. Y.

• **Everett L. Mueller**, formerly branch manager at Milwaukee for Victor Adding Machine Co., Chicago, has been promoted to assistant branch manager for Chicago. **Thomas D. Clark**, formerly national accounts supervisor for Chicago has been promoted to fill the position in Milwaukee. Mr. Mueller has been with Victor since 1937 and Mr. Clark since 1941.



RALPH G. CAOUETT**E**, general manager, Pittsburgh Equitable Meter Div., Rockwell Mfg. Co.

• **Ralph G. Caouette** has been appointed general manager of the Pittsburgh Equitable Meter division of Rockwell Mfg. Co., Pittsburgh. Mr. Caouette has had wide and varied experience with Rockwell, having been production superintendent of the Delta division, then manager of industrial engineering for all the company's plants and more recently general manager of the Red Star Products division.

• **Franklin S. Helfter**, superintendent of the Huntley steam-electric stations of the Buffalo Niagara Electric Corp., has been named general superintendent of the combined operations of the Huntley stations at Buffalo and the Dunkirk, N. Y., station, now under construction.

• **Henry Z. Carter** has been named general manager of Avondale Marine Ways, Inc., Westwego, La. Mr. Carter has been comptroller of the company for the past two years.

• **Jack J. Mitchell** has been appointed manager of lake coal sales for Oglebay, Norton & Co., Cleveland. Mr. Mitchell joined Island Creek Coal Co. in 1931, becoming general manager of sales. In his new position he is responsible for the sale and transshipment of coal for lake movement.

• **G. L. MacLane, Jr.** has been appointed assistant manager of the engineering laboratories and standards department, Westinghouse Electric Corp., East Pittsburgh, Pa. **L. J. Berberich** has been named manager of the Liaison Section of that department. Mr. MacLane has been with Westinghouse since 1936. Dr. Berberich joined the insulation department of the corporation's research laboratories in 1937.

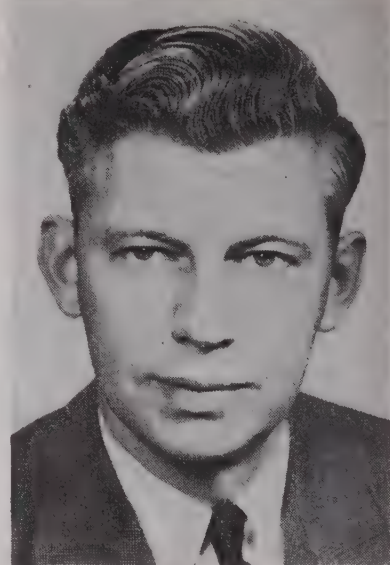
• **O. A. Schilling** has been placed in charge of the newly-formed eastern sales division; **H. E. Langdon**, the central sales division; **R. B. Warren**, the southern sales division, and **R. G. Abbott**, the western sales division, of mechanical goods sales, Goodyear Tire & Rubber Co., Akron, Ohio.

• **Alan T. Wolcott** has been appointed manager of advertising and sales promotion and **John A. Grove**, manager of marketing research for the Chemical Dept., General Electric Co., Pittsfield, Mass. Mr. Wolcott joined GE in 1937 and since 1946 has been a member of the chemical department's advertising and sales promotion staff. Mr. Grove joined the market research staff of the apparatus department in 1940 and has been engaged in market research activities with the chemical department since 1945.

• **Charles W. Van Horn**, vice-president in charge of operation and maintenance for the B & O Railroad, has retired, after serving the company for 48 years. He has been succeeded by **William C. Baker**, who has been assistant vice-president for operation and maintenance since last year.

• **Jack R. Allen** is severing his connection with the Heppenstall Co. and has established a manufacturers' representative office in Cleveland.

• **Alfred I. Stuart** has been appointed head of the Methods Engineering Dept., Hyster Co., Portland, Ore. Mr. Stuart joined Hyster following several years of experience with the Western Electric Co., E. I. duPont de Nemours & Co., Inc., and with a consulting industrial engineering organization.



LEO P. GAJDA, director of engineering, Snyder Tool & Engineering Co.

• **Leo P. Gajda** has been named director of engineering for Snyder Tool & Engineering Co., Detroit, succeeding **George D. Melling**, who has formed his own company, McCoy-Melling, the latter firm representing Snyder in Michigan, excepting the Detroit metropolitan area. **Elwood M. Keifer** has been named chief draftsman.

• **Harold A. Muttach** has been appointed general superintendent of the Koppers Co., Missouri-Illinois plant, Granite City, Ill. **John E. Brown** replaces Mr. Muttach as blast furnace superintendent and **James E. Oesterle** has been promoted to coke plant superintendent. Mr. Brown and Mr. Oesterle had both served as assistant superintendents in their respective departments. **George W. England, Jr.** has been promoted from blower to assistant blast furnace superintendent and **John J. Pistrucci** has been appointed assistant coke plant superintendent. He had formerly served as foreman of general byproducts.

• **Alfred Watson**, assistant manager of the Buffalo district office of Hagan Corp., Pittsburgh, has been appointed manager of that office, succeeding **Charles A. Randorf**, who has represented Hagan in the Buffalo district since 1928. Mr. Randorf continues his service of Hagan and other companies in Buffalo, operating **Charles A. Randorf, Inc.**, in conjunction with his son.

OBITUARY...

• **James R. Kelly**, 71, formerly superintendent of open hearth plant, American Steel & Wire Co., Cleveland, died March 14. After serving 24 years with the Wire Company, Mr. Kelly was transferred to the Carnegie-Illinois plant at Gary, Ind., taking charge of the openhearth plant there.

• **Charles H. Wilson**, 69, who developed the industrial use of the Rockwell hardness tester for metals, died March 10. Mr. Wilson, who also developed pyrometers for measuring high temperatures in industrial processes, was chairman of the board of Wilson Mechanical Instrument Div., American Chain & Cable Co., Inc., Bridgeport, Conn.

• **Walter R. Howell**, 69, president and member of the board, Bliss & Laughlin, Inc., Harvey, Ill., died March 15. Mr. Howell was also a member of the boards of Buda Co., Athey Products Corp., Indiana Steel Products and Globe Steel Tubes Co.

• **George E. Chatillon**, 70, president of John Chatillon & Sons, New York, since 1903, died March 10.

• **Frederick N. Farrell**, 58, night superintendent, General Electric Co. plant at West Lynn, Mass., died March 7.

• **Raymond F. Russell**, 58, vice-president of Hartley & Sleeper, Worcester, died March 6.

• **George H. Whittle**, 78, owner, George H. Whittle, a sheet metal company in Worcester, died March 3.

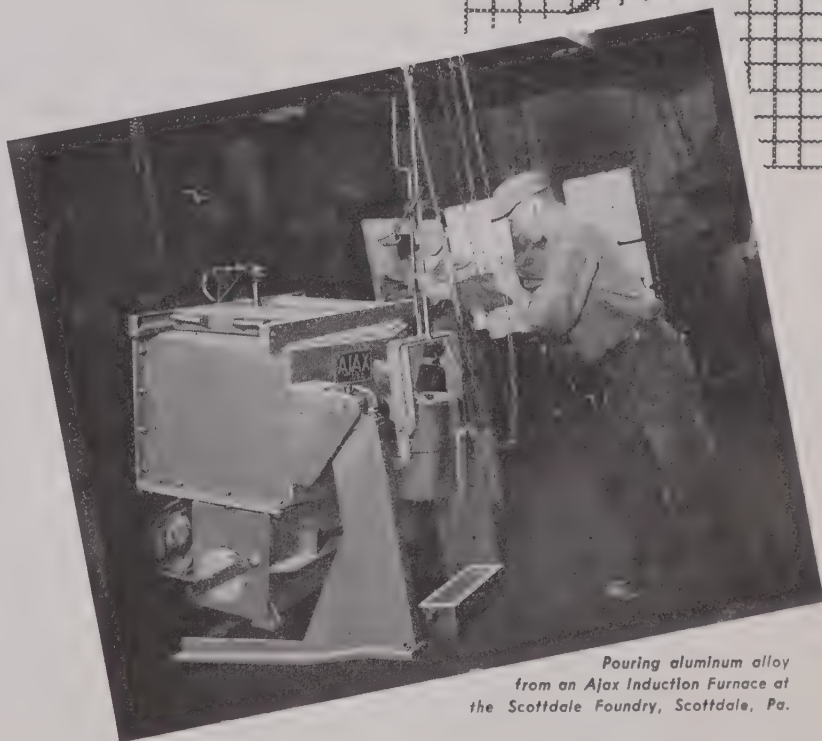
• **Alfred C. Faul**, 78, president, Faul & Timmons Co., Buffalo, died March 10.

• **Robert W. Dakin**, 55, assistant manager, Thew Shovel Co., Lorain, Ohio, died March 15. He had been with Thew 27 years.

• **William C. Madsen**, 30, branch manager, Reliance Electric & Engineering Co., Cleveland, died March 8.

AJAX INDUCTION FURNACES

ARE KEPT BUSY PROVIDING
ALUMINUM FOR **MILLIONS**
OF CASTINGS!



Pouring aluminum alloy
from an Ajax Induction Furnace at
the Scottsdale Foundry, Scottsdale, Pa.

SUBSTANTIAL SAVINGS IN TIME, LABOR, METAL, AND
FLOOR SPACE, PLUS HIGH COUNT OF PERFECT CAST-
INGS WITH AJAX ELECTRIC INDUCTION FURNACES

- No flux needed—no mechanical stirring—no segregation occurs, because metal is in constant circulation.
- Costs less than conventional combustion firing—avoids overheating as temperature control is completely automatic.
- Low upkeep—linings average two years of service—almost no down time—lower melting losses.
- Temperature held within $\pm 5^\circ\text{F}$ —metal kept at lowest feasible casting temperature—no danger of overheating.
- Harmful impurities removed—less dross—no iron pick-up—iron impurities adhere magnetically to passage walls.
- High yield of perfect castings—a remarkably low scrap loss, that is possible only with induction furnaces.
- No fumes—almost noiseless operation—cooler shops—lower installation and maintenance costs.
- Automatic electric controls require a minimum of attention—less labor than for fired furnaces.
- Requires 30% to 40% less floor space than any other type of induction furnace—heavy steel construction for long life.

AJAX ENGINEERING CORPORATION, Trenton 7, N. J.

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INDUCTION MELTING FURNACE

Associated Companies: AJAX METAL COMPANY, Non Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax Horizontal High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax High Pressure Electric Salt Bath Furnaces
AJAX ELECTRIC FURNACE CORP., Ajax Vertical Induction Furnaces for Melting

European Letter . . .

• Atlantic Pact provides maximum deterrent to war by collective action . . . Disarms Communists by achieving military security . . . Contributes to European economic recovery.



LONDON — All over western Europe there should be heard a sigh of relief that the draft of the North Atlantic Pact is now published, offered for debate, and ready for signing on April 4 in Washington. The relief should be audible, but it may not be. For the shield that America and Canada are offering to western Europe has lost some of its sheen from the hot breath of debate that has beaten on it already. And some of the expectancy and anxiety with which the offer was awaited have already been dispersed by the diplomatic trial of strength between the west and Russia which took place earlier this month. Norway, under direct pressure from Moscow turned to Washington, asked what protection the pact would, in fact, give, was satisfied with what it heard, and rejected in firm and confident fashion the nonaggression pact offered by its angry and nervous neighbor. That was proof in advance of publication that the pact would have teeth in it. That was as it were, the dress rehearsal for the pact's launching; and Americans should not feel disappointed if the public ceremony creates less interest and confidence than the private. The power of the pact having been proved already, there will be more disposition to discuss it freely.

In other words, there will run beneath the chorus of praise and gratitude a steady current of criticism which cannot be ignored. In one respect this will be unfortunate, for it will suggest ingratitude where deep appreciation is due and felt. What has been undertaken by the United States and Canada in this pact is far in advance of anything that could have been hoped for three years ago. In ten years America has passed from neutrality and nonintervention in the peacetime affairs of Europe to determined and generous intervention. The balance of power in the Old World is being restored faster than anyone dared hope. The American response to the Soviet-Communist challenge has been swift, imaginative and bold. Whatever causes might lead to war—and it is generally believed that Mr. Stalin never wanted anything beyond a cold war—uncertainty about America's interest in western Europe can no longer be numbered among them.

IN the period that must pass before the North Atlantic Pact is signed, and in the months that must pass before all signatures to it have been ratified, discussion is likely to fasten on three points. First, it will be asked whether the pact has not been diluted by being extended to cover too many countries and too wide an area. Second, it will be suggested that it ensures western Europe's liberation from an invader but does not guarantee it against invasion. And third, it will be argued that, by forming such a grand alliance, the North Atlantic countries may provoke the

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Soviet Union into the very transition from cold to real war which it is the purpose of the pact to prevent.

In its present form the pact brings together as foundation mem-

bers of the North Atlantic club the United States and Canada on the one hand, and Britain, France, the Benelux countries and Norway on the other. They form the committee, as it were, of the club. They have framed the rules and they issue the invitations to join. They have formed the club because they are old associates; they are not associates because they have formed the club. Apart from Norway, which has earned its place by its independent and courageous attitude, this group of eight comprises countries already closely knit together by political ties and defense arrangements. It represents a merging of the Brussels Pact of two years ago into a wider instrument. Politically and strategically it is compact and stable, even when allowance is made for the strength of the Communist Party in France. It would appear obvious that the political and military effort imposed by the new pact should be concentrated in this group, for the sake of efficiency as well as of speed. Yet they have already invited Denmark, Iceland, Italy and Portugal to join them; and there is a suggestion that something must be done, too, for Greece and Turkey, and perhaps for countries even farther east.

The principle behind these invitations is clear. If it is desired to deter an aggressor by making it clear in what countries America deems itself to have a vital interest, then it is as necessary to warn him off Turkey and Persia as it is to warn him off Norway and France. Logically, there is no reason why the warning should not cover the Indian Ocean, and the whole of the eastern Mediterranean. Practically, however, such an extension would be wasteful and dangerous. There is a limit to the number of countries whose forces can be efficiently integrated; there is a limit too, and a tighter one than may be generally believed, to the military supplies which America

can quickly send to its allies. Above all, the dispersal of American resources is the wrong answer to the concentration of Russian strength.

WHY not, therefore, maintain in principle a distinction which must exist in fact: between countries which can contribute to the pact something to offset the liability they create by joining it, and those whose membership represents an addition to the obligations of the group without any corresponding addition to its strength? It is difficult to see, for example, what Italy can contribute to the pact: if it is to be protected against attack from outside, its geographical position opposite the Balkans, its strong Communist party (recently pledged to act as a fifth column) and its small armed forces, limited by a treaty to which Russia is a party—all these amount to pure liability. Portugal has already refused the only contribution it can make, the use of bases in peacetime.

Yet the pact is not one in which America does all the giving and the other signatories all the receiving of gifts. It is an agreement, as Article 3 insists, for "effective self-help and mutual aid." This should be the test. There should be one list of members (substantially complete already) who can meet the test (including the word "effective") without the need for polite equivocation, and another list of countries, including western Germany, whose territories are guaranteed by all the members of the Atlantic alliance but who are not, for the present, at least, invited into the inner counsels of the alliance. It should not be too late to make this distinction between the inner and outer circle which is bound to arise in practice.

THE argument against any dispersal of the available military forces and supplies is too strong to be ignored, and it leads to the heart of the second criticism of the pact that is likely to be heard. It is the point of view which is met most frequently in France and Belgium. The argument runs thus: by security western Europe understands adequate protection against invasion, not the promise of eventual liberation. If that protection cannot be given, it would prefer the risks of attempted neutrality to the risk of provoking invasion by accepting an American guarantee

similar to that given to Poland by Britain in 1939. This is not merely the argument of defeatists; it is the point of view of many brave and intelligent men and women west of the Rhine and of thousands who would cease voting Communist if they believed their future was secure. Unless the North Atlantic Pact offers them some satisfaction, it will not do what Mr. Acheson says he wants it to do—"contribute to economic recovery and stability in Europe by reducing the sense of insecurity."

Clearly the need cannot be met in the way that France tried to meet the threat of resurgent Germany between the war by lavishing men and materials on some static Maginot line. What is more, western Europe can afford no such solution if it is to achieve economic recovery. The basic American idea is right: to provide the maximum deterrent by collective action, to discourage local aggression by the threat of world war, and to disarm the Communists by achieving economic as well as military security. This is the strategy of cold war, not the strategy of generals of infantry and artillery. But even cold war needs forces in reserve—just in case; the Communist cold war has owed much of its success to the fact that the Red Army stands 600 miles west of the Soviet frontier. The western cold war too needs the presence in Europe of the troops of a Great Power—American troops or troops under American command; and the question is whether the pact makes such a contribution more likely.

Some comfort can be derived from the fact that the pact provides for the immediate forming of a military committee of its members. This means presumably two things: that the long-standing machinery of the American and British chiefs of staff, and the newly-built machinery of the Brussels Pact organization will be brought together. And that, in turn, implies that America will give priority for arms and supplies to the integrated forces which are already being planned by Lord Montgomery's staff. That should ensure, if the British and French defense ministers do their job properly, that there will be available in western Europe a hard core of ground and air forces around which American contributions can be gathered. But what those American contributions

are likely to be is still unknown; and it is on this uncertainty that continental critics will fasten. On this point, therefore, the size of western Europe's garrison, the Atlantic Pact can give only limited fresh hope. The most that can be said is that more can be done with it than without it. The demand that American and British divisions, not battalions, should be seen training in western Europe will persist.

IT will also be complained that the North Atlantic Pact will provoke Russia to pass from cold war to the real thing. This is the third line of criticism to be expected. To men who believe as Stalin once did and probably still does, that conflict between socialism and capitalism is sooner or later inevitable, American policy will seem aggressive, pact or no pact. And to men who believe that it is their mission in life to push the west along the predestined path of disintegration and collapse, the pact must seem a serious act of defiance. All that can be said to make its defensive purpose clear to such men has been said. It is the avowed purpose of the pact to do no more than provide through collective effort the defensive strength which the western countries could provide on their own only at the risk of economic collapse. The North Atlantic Council will be planning to avoid war, not to prepare for it.

Little, in fact, will be changed when the pact is signed on April 4. To those in the west who doubted America's sincerity and determination the significant point of the key paragraph—Article 5—will be the qualified undertaking to take "such action as it deems necessary, including the use of armed force, to restore and maintain the security of the North Atlantic area." To those in the west who had no such doubts, the clause simply makes explicit a constitutional difficulty which they had taken for granted. To those in the east who doubted whether Mr. Marshall — and now Mr. Acheson — had public opinion behind him, the answer has been given in black and white. Hitler had in 1939 the certainty, in the black and white of the neutrality acts, that America would not intervene if he went to war. Mr. Stalin in 1949 has the certainty of the exact opposite.

• **STEEL BACKLOGS**—Most steel companies have large backlogs of steel orders. A year ago they looked impressive to some people. Today they don't mean too much because anyone in steel with a long memory knows that they can melt fast. In 1937 unfilled order volume was heavy. Some items in the middle of 1937 were being promised in 22 weeks. It didn't take more than 3 months to get promises down to a few weeks and to see the backlog tonnage become merely paper. There are a few steel sales leaders who are afraid that the same thing may happen this year. But it may take another 3 months to prove whether or not this is true.

• **NO HURRY**—Barge shipments of steel are getting more attention. This is considered a business barometer because it means that some customers are not as rushed for steel as they were a few months ago and that they have sharpened pencils to save a few dollars a ton on their steel. In short, price is looming larger than delivery time for these fabricators.

• **MANGANESE PRICES UP**—Standard ferromanganese was advanced \$12 a gross ton last week by Electro Metallurgical Sales Corp. and Carnegie-Illinois Steel Corp., placing all producers on an increased price basis. Prices of ferromanganese briquets and silicomanganese were advanced by 45¢ and 35¢ per 100 lb, respectively. New Jersey Zinc Co. announced a \$3 a ton increase on all grades of spiegeleisen, effective Mar. 17.

• **POOR SHEETS; GOOD SCRAP**—The really poor quality sheets which once sold easily don't move now. This is scrap for the openhearth. Mills are tightening inspections to keep off-grade material out of shipments because customers are more particular than they were a few months ago.

• **FIRST IN 50 YEARS**—The first production of iron ore in British Columbia, Canada, in approximately 50 years will be undertaken in 1949. The ore will be mined from deposits of high-quality magnetite at Upper Quinsam Lake in the Campbell River watershed on Vancouver Island.

• **EXTRA CASH**—Prizes totaling \$2850 were distributed to 175 employees at the Boston Naval Shipyard Mar. 12 for suggestions that they had submitted for saving money and materials. These suggestions will save the Navy \$57,000 in the next year.

• **EASIER PIG IRON**—Consumers of pig iron are now able to buy iron strictly to specification. Silvery iron producers who have been out of the eastern market for some time are now offering tonnage there. Chester furnace iron is now being offered at \$54.00, a reduction of \$8.00 a ton. E. & G. Brooke Iron Co., whose production had been taken up principally by three consumers, are now offering iron to other consumers. Some factors view the possibility of a change in the market with an expected pickup in foundry business in April.

• **SIGN OF THE TIMES**—Here and there are reports that some steel firms are offering tonnage to people they have not seen for sometime. Maybe some of this is bonus tonnage. But old-timers know that this is the beginning of a trend. It means that some firms want to get more tonnage on their books in case things go a little haywire later in the year. It also means that things are definitely easier when compared with conditions several months ago.

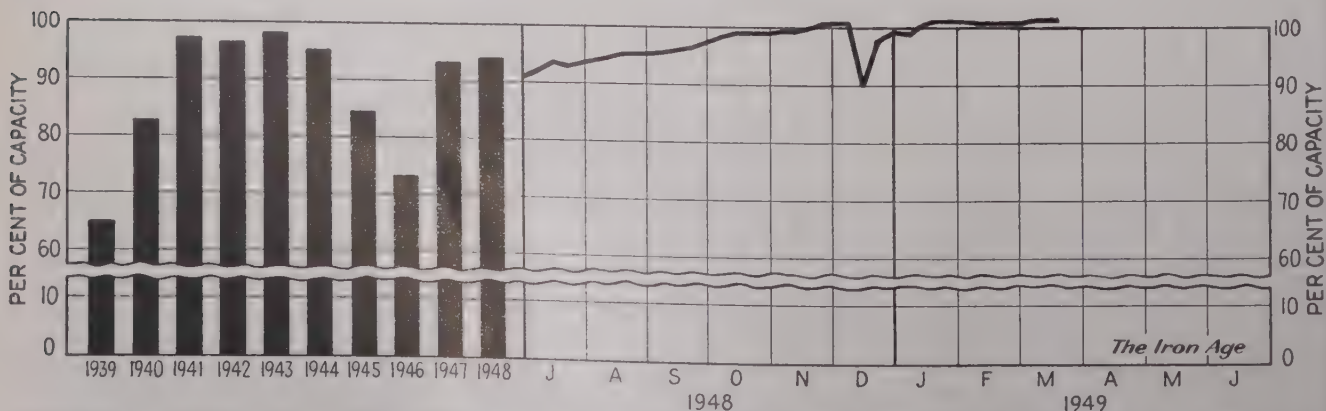
• **NO TAKERS**—Belgian steel in the form of plates, shapes and some flat rolled is rusting away on the docks down in Houston. This high priced imported steel bought months ago is no longer needed as domestic supply is adequate in Texas. Brokers who own it can't sell it today at any price and the scrap dealers in the area don't want it either.

• **COMPETITION**—Several steel companies whose prices have been higher than those of major competitors in their market areas are quietly shading their quotations or dropping them to the competitive level. Almost all inequalities in wire and wire products have been worked off since supply in most wire products now tops demand. At the other extreme, pipe will likely be the last to be dropped.

• **PIG IRON LOWER**—Colorado Fuel & Iron Corp. has announced price reductions in pig iron produced at its Buffalo and Minnequa, Colo., furnaces. Basic iron is now \$47.00 and malleable is \$47.50, f.o.b. furnaces.

• **DOUBLED**—Total output of pig iron in Bizonal Germany reached 4,610,000 tons in 1948, compared with 2,263,000 in 1947. Production of raw steel also increased from 2,945,000 tons in 1947 to 5,371,000 tons in 1948.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
March 15. . . .	103.5*	102.0*	95.0*	101.0	104.0	105.0	102.0	94.0	107.0*	102.0	110.0	89.5	112.5	102.0
March 22. . . .	102.5	101.0	95.0	100.0	107.0	105.0	102.0	95.0	104.5	100.5	110.0	82.5	112.5	102.0

* Revised.

Industrial News Summary—

- **Normal Steel Market Now Here**
- **Extreme Shortages Eliminated**
- **Scrap Quotations Still Falling**

MAYBE you couldn't get all the steel you wanted this week. But it was clear that for the first time since the war the "extreme" shortage which everyone has been hollering about is over. The steel market is now acting like a normal market for the first time since the late '30s. Not only that, it is competitive in price as well as in customer relationships.

It is true that if the coal strike lasts for more than 2 weeks it will affect the steel rate. If not in the near future then at midyear when more fireworks may begin. But even allowing for such an impasse it is still clear that the old "wartime-leftovers" in the steel market have gone by the board. This week the ingot rate is unchanged at 102 pct.

There are several good reasons why the present steel pattern holds little comfort for those who climbed on the Truman bandwagon for government-owned steel plants. And before the year is out there is every reason to believe that there will be no more talk about large scale capacity increases—especially when it is a fact that more capacity is still under construction.

The steel market this week is normal because: (1) The gray market is dead; (2) by the third quarter of this year most conversion deals will be a thing of the past; (3) steel firms that have been charging more than the regular mill prices for items are dropping their quotations to that level; (4) other firms are casting their eyes at new customers whom they haven't seen for some time; (5) cancellations are increasing; (6) scrap prices have slipped hard and (7) some steel companies are thinking seriously of opening books for all the tonnage they can take "just in case."

It may be the middle of the year before all steel items are really easy to get. But it is significant that no steel user is screaming that his plant is shut down or that he is losing production because he has no steel. Nor will that cry be raised again unless the coal situation gets much worse than expected.

THERE were still conversion deals being made this week for the second quarter but hardly any large company wants them for the third quarter. Even the present setups for second quarter delivery may be cancelled if they are not needed.

More and more of the uncancellable conversion deals are becoming a white elephant to some steel users—except in the case of large

gas pipe line commitments. But the way the wind blows is seen in the sale of ingots for \$75 to \$80 a ton when they brought more than \$100 just a few months ago. Selling them at all today is becoming a problem.

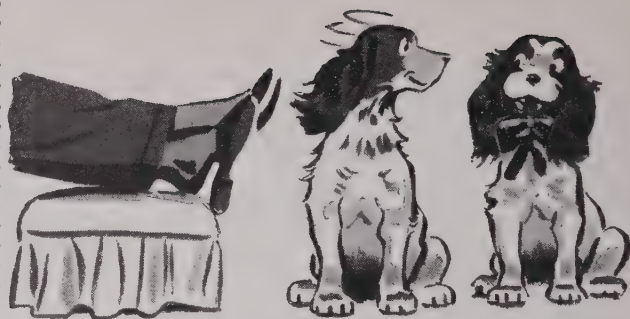
Another thing that is starting to plague the steelmaker is the tightening up on quality and specifications. About 6 months ago steel users would take anything. Now they act like women at bargain counters before they accept the order. Off heats—steel not meeting customer's specifications—are now popping up in some plants. This means that a lot of steel customers who are willing to take this steel will get more material. It also means that quality is tightening up.

Some more straws in the wind are: (1) Pig iron is easier to get—it is actually being sold, (2) some railroads have cancelled rail tonnage—not much, but some, (3) wire and wire products are almost in balance with demand, (4) alloy steel is just as good as off quota—no trouble at all to obtain, (5) some car builders have cancelled plates, structural shapes, sheets and bars, and (6) the word "reciprocity" is being whispered for the first time in years.

THE steel scrap market assumes that a normal steel market is here. And that it may be less than normal before the year is out. The heavy amount of scrap available for steelmakers even at the high ingot rate has again depressed prices. No amount of arguing that the long term shortage of scrap is still with us has caused the steel mills to buy or has acted as a brake on the price decline. Prices may be forced down too far and later rebound but there is no evidence of that this week.

Scrap people are meeting one of the worst markets in years. There is little buying. What buying there is, is dictated by the steel mill, not the broker or the dealer. Yards are filling up. No. 2 bundled scrap is sagging badly in price and there is no assurance that any large scale mill buys will be made soon to support the sagging price level.

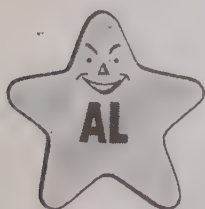
This week prices are off at Chicago and at Philadelphia. Nothing much is holding them at other centers. Even the prospect of a long coal strike has not added any zip to scrap quotations. THE IRON AGE steel scrap composite this week is off 66¢ a gross ton to \$34.92 a gross ton.



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High Auto Production Schedules Keeping Detroit Steel Demand Up

Detroit

• • • Steel producers have little to worry about at present if they think they are about to witness a quick collapse of the automotive market for steel.

The auto makers currently want more steel — not less. Despite small reductions by several independent producers, the total demand for automotive steel over the next five months will be up—not down. All the major producers are boosting their schedules. The big car builders say they are confident they can dent any sales barriers that are raised against them in 1949. What's more important to the steel industry — they're backing up their confidence with orders for more steel.

A survey of steel suppliers and users in Detroit this week revealed that the following developments are taking place:

(1) Each of the major producers is boosting its schedules over the next 5 months. One large motor car company is projecting its passenger car output nearly 30 pct above the present level.

(2) There is extensive switching from high priced cars to lower priced models and from trucks to passenger cars. Total steel requirements, however, are climbing—not receding.

(3) The total demand for steel for replacement parts continues at a very high level. Admittedly, the pipe lines for service parts are just about filled for most producers and may be spilling over in a few instances.

(4) The rush on steel mill offices is on again. This time, however, it's usually the parts maker rather than the car producer who is pounding the table. Some local steel representatives see this trend developing as a result of the efforts of major producers to shed their conversion deals. In many instances, it is pointed out, the car companies have been fur-

But Gray Market Is Dead And Conversion Projects Are Running Their Course

By WALTER G. PATTON
Detroit Regional Editor

nishing conversion steel to some of their hard-hit vendors.

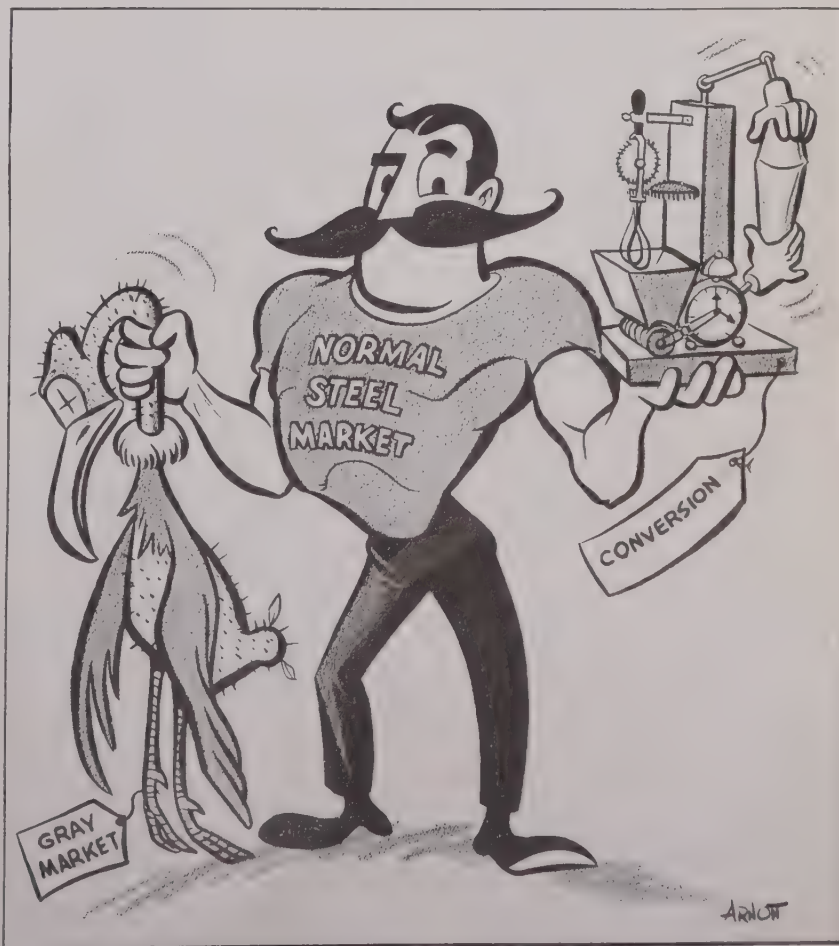
(5) Conversion steel buying is losing its appeal and fast—but it's still being done—grudgingly and for immediate needs. Two new commitments for the third quarter have already

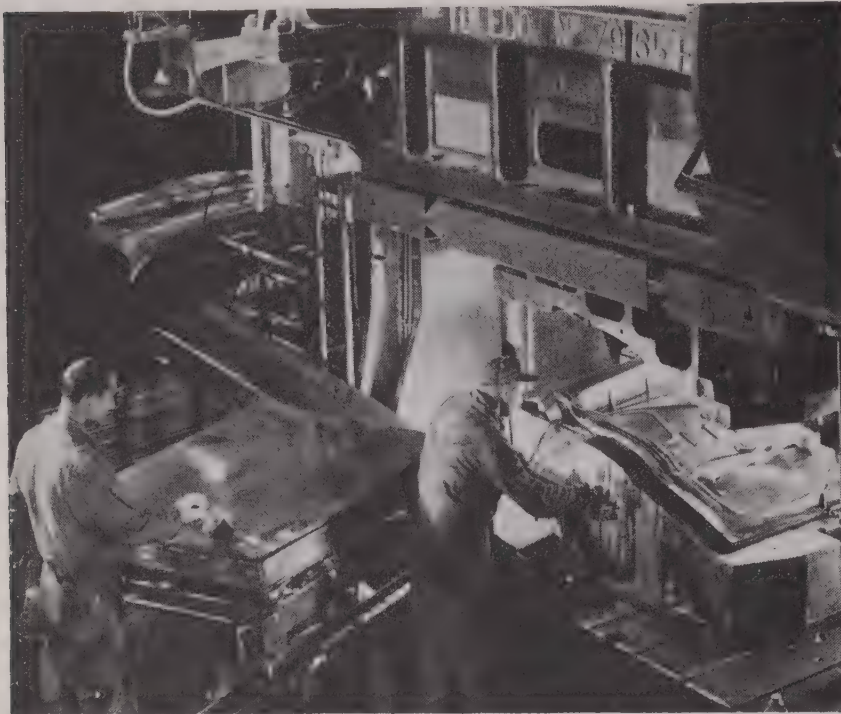
turned up. There will be more, of course. The conversion mortality tables being set up by the experts here show that at least half the existing conversion tonnage will be dead by July or August. But some of these deals may hang on until the year's end.

(6) Tightest items at the moment are steel for hoods, fenders and tops—parts that are seldom made of conversion steel. Where unbalanced stocks exist in the automobile plants the excess is usually steel originally purchased in odd lots or through conversion channels. This will, of course, tend to hasten the end of conversion.

(7) Steel inventory adjust-

Look Who's Here





INCREASED PRODUCTION: Big dies like this in the Detroit automotive plants are stepping up their production tempo during the coming months. At the present time an unprecedented quantity of steel is being used to keep these plants operating. Even larger quantities of flat rolled steel are expected to be needed in the next few months.

ments are being made but this is not yet an important consideration so far as flat rolled steel from mill sources is concerned. It is clear, however, that auto buyers more and more are going to insist on sheet sizes that will do the job most efficiently.

(8) Wire, alloy and forging bars appear to be the easiest items at the moment on the automotive steel list. Some producers have reported hot rolled is also easier.

(9) While there are a few cancellations, there are many more instances where parts makers have requested delays on steel deliveries. In many instances the delays stem from revised schedules by Lincoln-Mercury Div. of Ford and recent cutbacks by Kaiser-Frazer, Packard, Willys and Hudson. However, these changes are hardly significant up to this time, according to local steel suppliers.

The days when anybody with a carload of steel could sell it to the first Detroit prospect are, of course, out the window. Today, Detroit buyers of odd lots of steel

are examining their steel very closely before they buy. The first step is to check the inventory. If the steel can be used for immediate needs, the buyer will usually insist on a sample to check size, finish, hardness and drawing quality. If the remainder of the steel fails to match the sample, it will be rejected.

Steel buyers are also insisting on a fair price. They know they are in a better bargaining position than they were a few months ago and they are naturally keeping a close watch on their steel costs. Odd lots of steel are still being sold here in considerable quantity, it is indicated, but the price and the quality must be right.

Another development that will bear watching is switching mill sources in order to obtain the lowest possible freight rates. In many cases these changes are being made with the full co-operation of both the mill and the steel user, it is reported. Steel buyers naturally favor such a change where a saving is promised and an adequate supply of steel is assured. There are also reports that pressures by steel suppliers on steel users to change to the clos-

est mill have been increasing.

There are few indications that the finished steel inventories of the big producers are too high although ingots are admittedly piling up. The amount of unbalance in finished steel inventories is, of course, higher than prewar when buyers could purchase exactly the material they wanted and in the quantities desired.

Parts makers, on the other hand, have a somewhat different problem. Several of the car producers have been cutting back their releases and this has called for a reduction in parts output if inventories are to be held at existing levels. Several steel suppliers report they have been asked to defer steel deliveries to parts makers on a limited number of items. However, only a few sizable orders have been cancelled. Usually, the cancellations have come from vendors supplying the appliance industry.

There can be little doubt that the major auto producers have their eye on production levels that will easily win for them a substantially larger share of the total automotive business than they have obtained in any postwar year. Most observers agree that the products of the major car producers are currently in better demand than the cars being turned out by the independents. The Big Three should have an excellent year in 1949—provided the sales departments they are welding together are able to carry the ball successfully against the line of consumer resistance many observers think they see in the process of formation.

Plan Brand Names Clinic

New York

• • • Ivor Kenway, vice-president of American Broadcasting Co., and Chairman of Brand Names Day Committee has announced a discussion by twenty-seven leaders in the fields of national sales promotion, retailing, research, employee education and community promotion. The 5 topical clinics will be held during Brand Names Day, Apr. 12, at the Waldorf-Astoria.

The five afternoon clinics will run simultaneously. Each will be lead by a moderator and a panel of five executives.

Pan-Tex Ordnance Plant Acquired by Texas Tech

Amarillo, Tex.

• • • **Texas Technological College**, Lubbock, Tex., has acquired the Pan-Tex Ordnance Plant from WAA. The property located here will be conveyed to the college at 100 pct public benefit allowance. During World War II Pan-Tex Ordnance was used in the manufacture of high explosives, shells and aerial bombs.

The college proposes to use the newly acquired property for advanced and graduate work in industry and agriculture, especial agricultural experimentation and research. About half of the college total enrollment are veterans. Under terms of disposal, the property is subject to national security plans. Included in the transfer are 16,093 acres of land and 600 buildings.

Blaw-Knox Backlog Rises

Pittsburgh

• • • **The backlog of unfilled orders of Blaw-Knox Co.** was \$39 million at the end of 1948, a 32 pct increase over the \$29.5 million worth of orders on the books at the beginning of the year. This, said William P. Witherow, president, is a reasonable indication of satisfactory volume in 1949.

In reviewing the year's operations on the company's annual report Mr. Witherow reported record peacetime sales of \$68,728,473. They were \$13.1 million above 1947 sales of \$55,626,055. Net profit for the year was \$4,050,895, an increase of \$1,107,194 over the 1947 net.

Reports Record Operation

Buffalo

• • • **Fedders-Quigan Corp.** local plants are operating at the highest peacetime level in the company's history with no letdown in sight, according to Edmund R. Walker, vice-president. Employment is about 1200, with several departments working 6 days a week. Orders for all products were reported substantial.

Mr. Walker announced production of a new line of convector radiators for the consumer market, representing a further diversification of products of the Buffalo plants.



British Foundrymen Tour Our Industrial Centers

Washington

• • • **An intensive five-week tour of American foundries and industrial centers** has been laid out for 15 visiting British foundrymen. They arrived last week to inspect and study American foundry methods and practices.

They are headed by F. A. Martin who is the managing director of the Osborn Foundry & Engineering Co. of Sheffield as well as president of the British Steel Founders Assn. Others in the group include 6 technical men, 3 additional foundry managers, and 6 representatives of labor.

It is the first of 30 such groups which will visit the United States this year. Arranged by the Anglo-American Council on Productivity, the visits are financed jointly by ECA and the British government.

Last week, the schedule called for the foundrymen to visit the American Steel Foundries and the Copper Alloy Foundry Co., both in New Jersey. This week's itinerary calls for visits to the Grebe Foundry & Machine Co. and others in the Milwaukee area.

Jumping back to Detroit, automobile factories will be visited with side trips to the Ford foundries at River Rouge and in Canada as well as to the works of the Michigan Steel Castings Co. Chicago plants to be visited include the Continental Foundry & Machine Co. works and a trip will be made through central Ohio with some time spent with the Battelle Institute, foundry research organization in Columbus.

Five days will be devoted to the Philadelphia industrial areas before returning to New York to board ship to England on Apr. 28.

The British visitors had been preceded by a few days by a group of 12 Swedish labor delegates representing metalworking, mining and other unions. Scheduled only to remain for 2 weeks, the Swedish group planned to visit the Bethlehem works at Sparrows Point as well as a trucking depot, a de-tinning plant and other industries in Pittsburgh.

At the same time, still a third team comprised of 3 high Italian labor figures was visiting United States industrial plants, mainly in Detroit. Also scheduled for a 2-week visit, the Italians planned to look in on some management-labor arbitration proceedings if possible.

Industrial Briefs . . .

• **METAL PATCHING**—R. M. Hollingshead Corp., Camden, N. J., has reached an agreement with the Howard Paint Div. of Reconditioning Products, Cleveland for the manufacture and marketing of Howard's new cold metal and plastic patching method of repairing auto bodies and metal surfaces.

• **PREST-O** — The Linde Air Products Co., New York, has announced that its new plant, producing Prest-O-Lite acetylene at Albuquerque, N. M., has begun operations. A warehouse for the distribution of Union carbide is also located on the plant premises.

• **CLOSES DOWN**—Yale & Towne Mfg. Co. has announced that its Appliance Div. plant at Buffalo, which manufactured electric flatirons, is being closed and that inventories will be sold.

• **CANADIAN OUTLET** — Norton Co. has announced the purchase from Durham Chemicals, Ltd. its Cap de la Madeleine, Quebec plant which will be used for the manufacture of silicon carbide and operated as a Norton subsidiary.

• **ELECTS LEADERS**—The Industrial Unit Heater Assn., Detroit, has elected the following officers for the ensuing year: H. S. Wheller, president of L. J. Wing Mfg. Co., New York, president; L. D. Mandell, vice-president of C. A. Dunham Co., Chicago, vice-president; and L. O. Monroe, secretary-treasurer.

• **MORE ROOM** — A. O. Smith Corp. of Milwaukee has installed a shop with complete production facilities for the manufacture of transfer equipment. P. S. Thompson has been appointed products supervisor for this facility.

• **No. 2 MAN**—John C. Oliver has joined the staff of the Porcelain Enamel Institute, Washington, as assistant to manag-

ing director, Edward Mackasek. With the addition of Mr. Oliver, the PEI plans to further expand its services to its members and the industry.

• **WANT TO LEARN?**—Engineers and management specialists interested in attending a short course in corrosion engineering are invited to write Nathan Schofer, Cities Service Refining Corp., Tutwiler Refinery, Lake Charles, La. The National Assn. of Corrosion Engineers would like to get a consensus on the proposed course, and if sufficient interest is evidenced, make arrangements with a university engineering school to hold it this year.

• **WINS MEDAL**—The Egleston Medal, awarded annually by the Columbia University Engineering School Alumni Assn. for distinguished engineering achievement, will be presented this year to Harvey S. Mudd, president and managing director of Cyprus Mines Corp. Mr. Mudd has been active for many years in the development and management of copper mines in the Island of Cyprus.

• **TRANSFERS TOOLS** — Clark Equipment Co. has announced the transfer of substantially all of the assets of its Celfor Tool Div., Buchanan, Mich. to Avildsen Tools & Machines, Inc., Chicago and New York. It will continue to market the Celfor line under the same trade name.

• **GOES WEST**—The Los Angeles rod and tube mill of the recently created Pacific Coast Div. of Revere Copper & Brass Inc. will be formally opened on Apr. 18. The new plant, headed by Wallace H. Hitchcock, division manager, is expected to turn out at least 1 million lb of copper products a month.

• **FLANGE AGENT**—Tube Turns Inc., Louisville, has appointed the A. B. Judd Supply Co. of Houston a distributor of its welding fittings and flanges.

W. L. Maxson of Oliver Iron Appointed to AEC Advisory Committee

Washington

• • • **Appointment** of Walter L. Maxson, vice-president of Oliver Iron Mining Co., Duluth, Minn., to the Atomic Energy Commission's Advisory Committee on Raw Materials has been announced by John K. Gustafson, AEC's Raw Materials manager.

Since 1944 Mr. Maxson has been vice-president of Oliver Iron Mining Co. His previous association has been with the Allis-Chalmers Manufacturing Co. as sales manager and chief engineer of the Mining Div. He has also served as associate professor of metallurgy at the Colorado School of Mines and has been connected with several other mining companies.

Reports on Development Of Ductile Gray Iron

Cleveland

• • • **Speaking on methods** of production and properties of nodular gray iron, C. O. Burgess, technical director, General Foundry Founders' Society, Inc., addressed an Ohio Regional Foundry Conference recently at Columbus, Ohio. Mr. Burgess made a progress report to the gray iron industry on the revolutionary development of ductile gray irons. He compared the advantages of cerium and magnesium treatments, the most common methods for producing the required nodular graphite structure.

A comparison of properties of these new irons with standard flake graphite irons brought out the many advantages and probable place of such irons in the commercial field.

Mr. Burgess stated that as far as he knows, there is no commercial production yet, as experiments are still in process regarding converting laboratory or pilot plant results to commercial scale.

He warned against promiscuous use of magnesium in the foundry because of its highly explosive character when added to molten iron. Special precautions are necessary unless comparatively dilute magnesium alloys are employed.

Steel Pipe Producers Eye Growing Market for Radiant Heating

Pittsburgh

• • • When supply definitely tops demand steel pipe makers will jump into the radiant heating field with both feet. Even now several butt welded steel pipe makers have an eye on the field and most others are checking the possibilities of this relatively new application. But the mere fact that steel pipe prices are half those of wrought iron doesn't tell the whole story. Wrought iron will put up a stiff fight.

Ask a man what word he associates with "red" and he's likely to say "dress." Ask him what follows "radiant heating" and he is even more likely to reply, "wrought iron pipe." The association is no accident. It is due to the efforts of A. M. Byers Co., its research, sales and publicity efforts during the past 11 years.

Radiant heating is not new; the Romans used the principle. For over a decade it was used in Europe, notably well in the British Isles, before it became prominent in this country. In the United States Byers Co. was the first

Butt Weld Steel Pipe Makers Will Go For Business As Level of Demand Dips

By GEORGE F. SULLIVAN
Pittsburgh Regional Editor

to push it. By dramatizing it and their primary product, wrought iron pipe, Byers sold the idea to a lot of people, engineers and architects included.

It has been said that just before the war what the trade calls "wet heating" was wobbling, reeling under a forced air heating hurricane, when radiant heating came along to revive it. For all this the steel pipe makers have a warm spot in their hearts for Byers. But this is not likely to slow them down when steelmakers start after the radiant heating market on a big scale.

What is the radiant heating market? No one really knows. It

breaks up into two parts: (1) Cases where it is used instead of other types of systems; and (2) entirely new applications.

When it replaces conventional steam or hot water it may take 5 to 7 times as much pipe. Air conditioning, which for a while threatened to capture most of the residential heating market uses very little pipe. Space heaters require very little pipe but are very widely used in plants, warehouses, hangers, etc. What percentage of these markets may swing over to radiant heating is a question. The only light on the subject is the fact that radiant heating applications are growing and that Byers and the few steel pipe makers who have publicized it are getting a lot of inquiries.

The most promising use of radiant heating which does not compete with any existing systems is for snow melting. Systems have been installed to keep sidewalks dry in front of buildings, to melt snow on residential and industrial driveways. Some airport hangar floor installations run out

INSPECTION:

R. H. Smith, Jones & Laughlin Steel Corp., and Ed Schneider, superintendent for the piping contractor, looking over part of the radiant heating installation in Ohio State University's \$8 million medical center. The project will use more than 65 miles of J & L steel butt welded pipe.



to keep plane-handling aprons clear. Estimates have been made for airport runways and for the Pennsylvania Turnpike. The latter would be tremendous installations; it takes about 1 ft of 1½-in. pipe for each 1½ sq ft of concrete. Wrought iron producers point out in outdoor installations using antifreeze solutions which undergo chemical changes after years of use corrosion problems may arise necessitating the use of wrought iron pipe.

Steel pipe manufacturers have been slow getting into this market though several long ago made a point of getting a few interesting jobs. When they start pushing hard for business these will serve as examples of what can be done. Why has Byers secured most of the business to date? Byers says it is partly because wrought iron lasts almost indefinitely, presents no corrosion problem. Steel pipe people say their product presents no corrosion problem either and point to steel pipes in closed heating systems (steam or hot water) which usually outlast their buildings. They say they couldn't jump into the field because of the war—for radiant heating practically grew up hand and hand with the pipe shortage. But since there was an equivalent shortage of wrought iron pipe, this may not be the answer.

Byers isn't particularly wor-

ried. They say radiant heating systems involve corrosive problems which are not immediately apparent and that design problems are not as simple as the theory would indicate. Their engineers are a lot more humble about design than they were 6 or 7 years ago. With 11 years of installation and operating data to work with they claim to have worked out a lot of unthought-of wrinkles.

The steel people counter by saying they have experience too; they claim the systems are not hard to design, point out that many have been fabricated of butt-weld steel pipe. They argue that corrosion problems are over-emphasized.

Byers argues that experience with heating factory floors and basementless houses is one of

their strong points. Their engineers point out that the radiant heating pipe is usually not fully surrounded by concrete and that there is a corrosion problem. No matter how this one turns out, and steel pipe people have counter arguments to offer, there are places (walls and ceilings) where corrosion problems won't cut too much ice, according to steel pipe workers.

Cost differences may be a point in steel pipe sales stories. It's a matter of about \$110 a ton for steel against \$220 a ton for wrought iron. A 5-room house takes about 0.7 ton of piping and the difference in cost amounts to about \$80. It would run to thousands in a big building. But as the wrought iron pipe people point out, these are still small (about 7 pct) in proportion to the total contract.

New Dept. of Commerce Policy Upon Imported Tin-Bearing Alloys

Washington

• • • Applications for authority to import tin-bearing alloys into the United States during the second quarter of 1949 must be on file by March 31, the Dept. of Commerce has announced. Department policies authorizing private import of these alloys, and the conditions

under which import licenses will be granted, are set forth in Allocation Order M-43.

Import license applications (Form ODC 1041) should be addressed to the Tin and Antimony Section, Office of Domestic Commerce, Dept. of Commerce, Washington 25, D. C.

Conditions under which tin alloys may be imported:

1. Limits on material to be imported:
 - (a) Less than 90 pct tin contained.
 - (b) In pig or ingot form only.
 - (c) Material may not be of such nature as to be considered especially prepared for a non-permitted use (i.e., Britannia or pewter metal).
2. Conditions to be met if import license is to be granted:
 - (a) Quantity in any one month must fall within the total quantity of imports (250 tons of tin contained per quarter) established by the U. S. Dept. of Commerce (excessive applications will be denied or reduced).
 - (b) Importers must certify to a firm offer of material by a supplier to the importer, and country of origin. Copy of export license (or certification as to license number, date, etc.) from country of origin, where required by said country, must accompany (or be stated in) application for import license.
 - (c) Import license application must show:
 - (1) Quantity of material.
 - (2) Assay or assays.
 - (3) U. S. customers to whom it is intended or contracted to sell.
 - (4) Quantity to each.
 - (d) Tin units contained in the material will be charged against the U. S. customer's allocation of pig tin in month or quarter in which material is received.
 - (e) The material may be used only in accordance with the provisions of Order M-43.
 - (f) Material may be imported only by or for customers who now receive pig tin allocations and can use the material in the form imported.

Coming Events

- | | |
|------------|---|
| Apr. 4-6 | American Gas Assn., distribution, motor vehicle and corrosion conference, Cincinnati. |
| Apr. 5-6 | Metal Powder Assn., annual meeting, Chicago. |
| Apr. 8-9 | Lead Industries Assn., annual meeting, Chicago. |
| Apr. 11-12 | American Machine Tool Distributors' Assn., spring meeting, Savannah, Ga. |
| Apr. 11-12 | American Zinc Institute, annual meeting, St. Louis. |
| Apr. 11-14 | National Assn. of Corrosion Engineers, annual conference and exhibition, Cincinnati. |
| Apr. 11-15 | Western Metal Congress and Exposition, Los Angeles. |
| Apr. 14 | National Castings Council, annual meeting, Cleveland. |
| Apr. 18-20 | Midwest Power Conference, Chicago. |
| Apr. 18-20 | American Institute of Mining and Metallurgical Engineers, annual conference of Openhearth Steel Committee, Chicago. |
| Apr. 19-20 | Magnesium Assn., annual meeting, Chicago. |
| Apr. 22-23 | American Institute of Mining & Metallurgical Engineers, New England regional meeting, Springfield, Mass. |
| Apr. 25-26 | American Supply & Machinery Manufacturers Assn., Triple Mill Supply convention, Cleveland. |
| May 2-3 | Assn. of Iron & Steel Engineers, annual conference, Baltimore. |
| May 2-5 | American Foundrymen's Society, annual convention, St. Louis. |
| May 4-7 | Electrochemical Society, semiannual meeting, Philadelphia. |

Concrete Reinforcing Steel Institute Plans Annual Research Award

Chicago

• • • Concrete Reinforcing Steel Institute on Mar. 11 announced the establishment of an annual award to be given for "research contributing to the advancement of reinforced concrete; noteworthy contributions to the theory of reinforced concrete design, or improvements to reinforced concrete construction practices." The award consists of \$500 in cash.

The award committee of the Institute is composed of one representative from the American Concrete Institute, the American Society of Civil Engineers, and the Associated General Contractors of America. Any person, firm, or corporation within continental United States will be eligible to receive the award. The first award will be made at the 25th anniversary meeting of the Institute at White Sulphur Springs, W. Va., July 14-16, 1949.

Material submitted must clearly pertain to reinforced concrete research, design, theory or construction practices. Further information can be secured by writing Harry Delzell, secretary of the Institute, 38 South Dearborn St., Chicago 3, Ill.

Predicts Profitable Year

Niagara Falls

• • • The Carborundum Co. looks forward to more profitable operations this year than in 1948. H. K. Clark, president, told stockholders in his annual report.

He noted that in January and February of last year there were extraordinary losses from a strike at the Niagara Falls plant and certain unusual expenses resulted from the modernization program during the year.

"The year 1948 marked a major transition of the company," he said. "Our former highly centralized organization was decentralized into major divisions organized around groups of like products."

The company's 1948 net profit was \$1,046,922, equal to \$2.06 a share, compared with \$1,878,629, or \$3.69 a share in 1947. Sales

totalled \$43,450,788 against \$42,471,399 in the preceding year.

It was also noted that the new 525,000 sq ft Wheatfield plant of the Coated Products Div. will be in full production this Spring.

Besly Opens New Branch

Chicago

• • • E. K. Welles, president of Charles H. Besly and Co., Chicago, announced recently the opening of the company's new Detroit office at 7376 Grand River Ave., Detroit.

E. W. Hutchinson will be in charge of the Grinder and Abrasive divisions, while J. E. White will be in charge of tap sales at the new Besly Detroit office.

Retooling by Twin Coach 70 Pct Complete

Buffalo

• • • Twin Coach Co. reports tooling of its Cheektowaga plant for production on a multi-million dollar subcontract from Grumman Aircraft is 70 pct completed and that the first parts have been started through the fabrication department. Employment dropped to around 600 during the tooling up period.

Furloughed workers, however, will be recalled, starting Apr. 1 and by midyear plant rolls are scheduled to exceed 1200. Only other production operation is a "hangover" of bus parts for the company's Ft. Erie, Ont., plant.

30 YEARS AGO

THE IRON AGE, March 23, 1899

• "In response to a number of requests for some of the leading features of the boom of 1879-80, we present herewith a review of the course of prices during that remarkable period. The word 'boom' was then first applied to a rapid rise in prices. Nothing approaching it has since been seen until the present year, except the short lived improvement in 1895, which only lasted long enough to whet the appetites of those who passed through it and received some benefit from it."

• "Owing to the scarcity of steel billets the Apollo Iron and Steel Co. find it necessary to start up two 20-gross ton acid openhearth steel furnaces at Apollo, to supply themselves with steel. These furnaces have not been operated for some years."

• This article appeared in THE IRON AGE: "The Magnates of the Wire Industry—The Career of the Officers of the American Steel & Wire Co." A summary of all the officers' lives followed.

• Sir David Dale wrote: "Although I hold unions to be desirable and needful, and regard their usefulness as proportionate to their numerical strength, I cannot approve of the employer being made to compel men to join."

• "The best enamel will chip or scale from iron which was not properly prepared. Sheet metal, especially stamped ware, after having been annealed in special furnaces, is subjected to a pickling process in diluted sulphuric or muriatic acid. After an immersion of several hours and thorough scrubbing the last traces of acid are removed by dipping the articles in boiling soda solution. They are now ready for the application of the enamel."

• "The advance of prices by jumps and bounds continues in all lines. Common Machine Steel Bars are quoted from 1.50¢ to 1.75¢ Pittsburgh, although in some instances local concerns are still selling out of stock at warehouse at those figures."

States Steel Basis For Western Industrial Growth

San Francisco

• • • A healthy, growing, highly electrified steel industry is the basis for the recent phenomenal expansion of western industry, according to G. E. Stoltz of Pittsburgh, consulting steel mill and metalworking engineer for the Westinghouse Electric Corp. He told members of the San Francisco Section, American Institute of Electrical Engineers recently.

"Steel plants are literally magnets for other plants making use of their products. Industries making a wide variety of steel products are springing up in the vicinity of your new western steel mills, even as they did a half-century ago in the East."

Reduce Shipping Losses

New York

• • • Hundreds of millions of dollars are lost annually to industry, carriers and the public through poor cooperation between carriers and shippers, as dis-

closed by Henry H. Pratt, president of the Atlantic States Shippers Advisory Board and General Traffic Manager, Crucible Steel Co. of America.

According to Mr. Pratt, inadequate, outdated practices in material packaging, labeling and handling, resulted in over \$120 million in rail claims alone for 1948. Losses can be reduced by an inter-plant study of packaging and cooperative research with external carriers.

Most problems of packing and shipping practices can be solved by a sound engineering approach. It is estimated that cooperation between carrier and industry on mutual problems could reduce damage claims by 50 pct.

Sees Business Slowing

Boston

• • • James V. Toner, president of Boston Edison Co., recently told his stockholders that "we see some signs in our load curve over the last 2 months of a slowing-up in business in our territory, but up to date not pronounced enough to be considered as a trend."

Coke & Chemical Firm Reports Record Sales

Pittsburgh

• • • Pittsburgh Coke & Chemical Co. expects to have a "highly satisfactory" year, according to R. M. Marshall, president. He made the prediction in the company's annual report which reviewed the record sales of 1948.

Sales last year, Mr. Marshall said, were \$20,598,016, a peacetime record, and \$3,415,016 better than 1947 sales. Net income was \$2,024,515, or \$3.40 a share. In the previous year net income amounted to \$2,762,736, or \$4.68 per share. The 1947 figure included \$1.71 per share of profit on the sale of iron ore properties.

He referred to the installation of 35 new coke ovens, 20 to be financed by General Motors Corp., saying they will give the company a potential of about \$5 million in additional sales. Construction and expansion costs were \$2.5 million last year and will add up to at least another \$2 million in 1949. Aside from the coke ovens, most of the new facilities are in chemicals and cement.

Anglo-American Contract

Cleveland

• • • Wean Equipment Corp. recently concluded an agreement with Joshua Bigwood & Son, Ltd., Wolverhampton, England, whereby Wean Equipment Corp. has entered into an exclusive arrangement for the manufacture and sale of Bigwood tube, bar, and shape straightening machinery.

The main plant of Wean Equipment Corp. is in Cleveland. In addition to this line of straightening machinery, the Wean Equipment Corp. specializes in the manufacture and sale of strip, wire mill, and wire fence machinery.

Decrease in Net Income

Providence

• • • Brown & Sharpe Mfg. Co. and subsidiaries, reporting for 1948 show a net income of \$1,019,231, equal to \$1.47 a share. Net for 1947 was \$2,653,311 and earnings per share \$3.83.

Net sales last year were \$22,836,530; previous year \$28,568,555.

AMERICAN IRON AND STEEL INSTITUTE SHIPMENTS OF STEEL PRODUCTS ALL GRADES INCLUDING ALLOY AND STAINLESS (Net Tons)						
JANUARY - 1949						
Steel Products	Number of companies	Tons	Current Month		To Date This Year	
			Net Shipments (Including Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale) (Net Tons)	Per cent of Total Shipments	Net Shipments (Including Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale) (Net Tons)	Per cent of Total Shipments
Ingot, blooms, slabs, billets, tube rounds, sheet and tin bars, etc.	44	1	288,991	5.0	295,155	
Skep	6	2	4,933	0.1	45,636	
Wire rods	19	3	54,243	0.9	23,242	
Structural shapes (heavy)	14	4	356,063	6.2	2,066	
Steel piling	5	5	26,182	0.5	-	
Plates	28	6	608,291	10.6	29,315	
Rails—Standard (over 60 lbs.)	7	7	167,220	2.9	361	
Rails—All other	8	8	13,663	0.2	94	
Joint bars	9	9	12,241	0.2	2,319	
Tie plates	10	10	39,192	0.7	41	
Track spikes	11	11	13,075	0.2	-	
Wheels (rolled or forged)	12	12	29,805	0.5	86	
Axles	13	13	19,562	0.3	4	
Hot rolled bars (including light shapes)	14	14	768,087	12.3	77,786	
Hot rolled bars—Reinforcing	15	15	138,860	2.4	89	
Cold finished bars	16	16	142,418	2.5	1,278	
Tool steel bars	17	17	6,623	0.1	118	
Pipe—Standard	18	18	188,881	3.3	5,474	
Pipe—Line	19	19	169,682	3.3	2,665	
Pipe—Oil country goods	20	20	125,752	2.2	8,837	
Tubes—Boiler	21	21	10,097	0.2	1,572	
Tubes—Mechanical and pressure	22	22	74,088	1.3	2,610	
Miscellaneous pipe (including conduit)	23	23	24,562	0.4	560	
Wire—Drawn	24	24	235,881	4.1	15,316	
Wire—Nails and staples	25	25	75,099	1.3	1,185	
Wire—Barbed and twisted	26	26	22,191	0.4	4	
Wire—Woven wire fence	27	27	34,511	0.6	396	
Wire—Bale ties	28	28	6,108	0.1	-	
Black plate	29	29	65,136	1.2	-	
Tin andterne plate—Hot dipped	30	30	140,560	2.4	10	
Tin plate—Electrolytic	31	31	1,535,000	2.8	42	
Sheets—Hot rolled	32	32	632,747	11.0	70,560	
Sheets—Cold rolled	33	33	603,893	10.5	1,792	
Sheets—Galvanized	34	34	141,000	2.4	157	
Sheets—Long term	35	35	12,309	0.2	91	
Sheets—Enameling	36	36	23,347	0.4	90	
Sheets—Electrical	37	37	48,715	0.8	-	
Strip—Hot rolled	38	38	134,348	2.7	31,284	
Strip—Cold rolled	39	39	163,611	2.8	1,973	
All other	40	40	12	-	-	
Total steel products	138	41	5,761,959	100.0	623,058	

During 1947 the companies included above represented 99.5% of the total output of finished rolled steel products as reported to the American Iron and Steel Institute.

Brooklyn is 3500 Miles from Pittsburgh for Atom Smasher Parts

Pittsburgh

• • • Shipment of two 92-ton copper cyclotron coils from Brooklyn to Pittsburgh may go down in history as 1949's most fantastic transportation rhubarb. To get the coils from the Brooklyn Navy Yard, where they were built, to the Carnegie Institute of Technology nuclear research laboratory near Pittsburgh involved a 7-month battle not only with the laws of physics but with the Pennsylvania State Highway Dept. and a 3500-mile water voyage.

The coils are part of Carnegie's 400-million v synchro cyclotron being built at a cost of more than \$1.5 million. They will be installed on the already assembled cyclotron magnet frame. The frame itself presented some transportation problems requiring shipment of forged parts weighing up to 130 tons from Homestead Works of Carnegie-Illinois near Pittsburgh.

Too wide (20-ft diam) for rail shipment, it had been planned to truck the coils the 400 miles to the laboratory site at Saxonburg, 35 miles north of Pittsburgh. But when they were ready to roll Pennsylvania highway officials said "No."

Since they cannot be dismantled the problem was solved—up to a point—by water shipment. They were taken by a Seatrain steamer from Brooklyn to New Orleans where 100-ton cranes transferred them to Union Barge Line Co. barge. Some 2000 miles later, after a tow up the Mississippi, Ohio and Allegheny Rivers, they arrived at Kittanning, Pa.

Here they were to be transferred immediately to trailer trucks for the 33-mile trip from the river to the laboratory. Cranes were ready to lift them from the barges when the U. S. Army stepped in. The cranes could not be used on the river locks where the barge was moved for fear of damaging the hydraulic system that operates the gates.

It was then arranged to get them out of the barge with hydraulic jacks and roll them to position near the trailers. The trucking

Too Wide for Rail Shipment, Too Heavy for Highways, Coils Go by Water

• • •

company got a \$300,000 insurance policy on the cargo but the state highway department stepped in again. Its officials demanded a \$100,000 bond to cover possible highway damage. The Navy appealed to James H. Duff, governor of Pennsylvania, to cut the size of the bond when no bonding company would take the risk.

All the fuss was just one of the problems that the new laboratory head, Dr. Edward Creutz, has faced since he began to design the big atom smasher. For one thing, space and foundation problems dictated an off-campus location. The cyclotron setup will weigh

1500 tons. Water was another requirement. The coils will be cooled by oil at 600 gpm. The oil will be water cooled. Water will come from a nearby pond supplemented by one well which has already been drilled. Another well is contemplated.

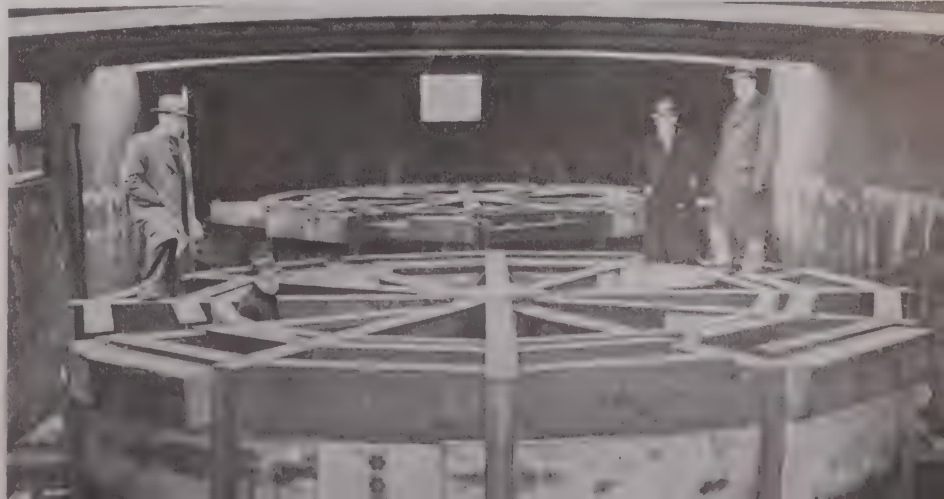
Although the Buhl Foundation, Pittsburgh, and the Office of Naval Research aid Carnegie in the support of the building and operation of the cyclotron, and Westinghouse is helping to get machinery, the design and construction of the buildings and most of the equipment rests with Carnegie Tech's physics department, headed by Dr. Frederick Seitz.

"A little nuclear research can go a long way," said Dr. Creutz. He was probably not referring to the 3700-mile trip of the magnet coils from Brooklyn via New Orleans. But he might have been.

RIGHT: Eight pieces of this size were forged and machined at Homestead Works of Carnegie-Illinois. Though it weighs 130 tons no highway complications were involved because it moved by rail to within a few miles of the Saxonburg, Pa. Laboratory site, required only a short truck haul.

• • •

BELOW: The 92-ton coils in the hold of a Union Barge Line Co., barge are inspected by officials from Carnegie Institute of Technology and the Office of Naval Research.



Firms Slash Prices On Refrigerators; Blame Competition

Chicago

• • • Sears Roebuck and Co. on Mar. 13 announced significant price reductions on its Coldspot refrigerator line. This was the second price cut within 3 months. Only last December Sears reduced its refrigerator prices on the average 5 pct. The last reduction amounted to 8 pct. Officials described the latest reduction as being a needed sales stimulant resulting from the return to an old fashioned competitors market.

On Mar. 20 International Harvester Co. announced price reductions averaging 8.3 pct on its household refrigerators. The company said the reductions "came about as a result of the competitive situation now existing within the refrigeration industry and would not otherwise be justified either by profit margins or by any reduction in the cost of producing and distributing these products."

Montgomery Ward & Co. also reduced the prices of all models of refrigerators and home freez-

ers sold by its stores. The company predicted a 20 pct rise in sales as a result of the cut.

Willys Slashes Prices

Toledo

• • • Price reductions ranging from \$25 to \$270 covering the complete line of Willys-Overland Jeeps, passenger cars and trucks have been announced.

Willys has attributed the reductions to improvements in steel and other supplies, easing of material shortages, production economies resulting from continued production of a single model, and functional design of the Willys vehicles.

The largest reduction was the Jeepster where the price was reduced from \$1,765 to \$1,495.

Midvale Enters New Field

Philadelphia

• • • After nearly 70 years in the field, the Midvale Co. has discontinued the production of rolled alloy, tool steels and stainless bar steels. The company will continue the production of cold-drawn alloy, tool steels and stainless bars.

Modernization of the company's bar mill equipment was considered too costly to undertake in view of the industry's present over-capacity for hot-rolled specialty bar tonnage under normal conditions of demand.

The Midvale Co. will replace this business by entering the large bearing ring field for heavy duty equipment. Small ring mill equipment is being added to plant facilities, to produce weldless rings from 6½ in. to 16 in. diam and up. The larger sizes will be produced on the company's present equipment.

Iron Ore Consumption Up

Cleveland

• • • U. S. and Canadian blast furnaces consumed 6,992,425 tons of Lake Superior district iron ore in Feb., according to monthly report of the Lake Superior Iron Ore Assn. Cumulative consumption for ore on Mar. 1 was 14,582,896 gross tons, more than a million tons higher than the 13,497,253 gross tons consumed by Mar. 1, 1948.

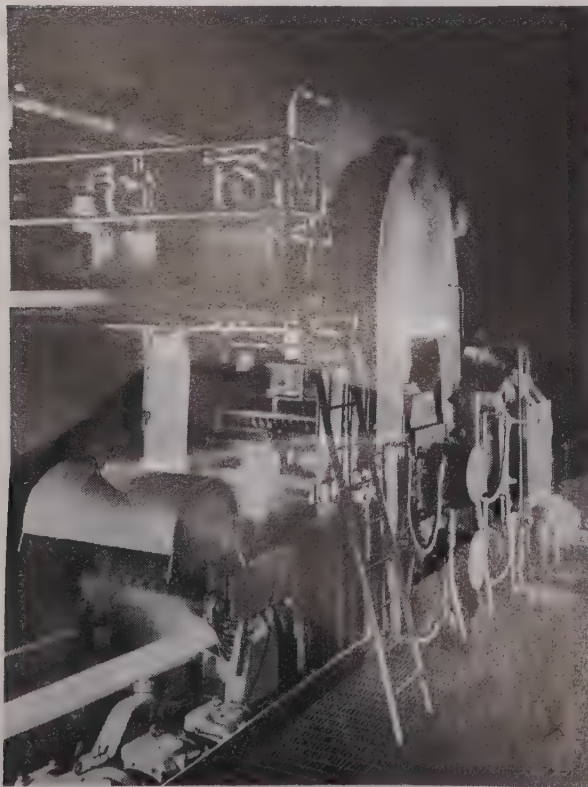
At present rate of consumption during Jan. and Feb., when furnaces used 7,590,471 gross tons of Lake Superior iron ore, 1949 consumption may well be in the neighborhood of 90 million tons.

Total stocks of iron ore on hand at furnaces and Lake Erie docks was 24,981,208 gross tons Mar. 1, compared with 31,904,181 tons Feb. 1 and 22,628,022 tons Mar. 1, 1948. Active blast furnaces depending principally on Lake Superior district iron ore numbered 178 U S and 9 Canadian. One Canadian and 8 U S furnaces were idle, the report showed.

Launches New Tanker

Quincy, Mass.

• • • The SS *Pennsylvania*, sponsored by Mrs. Cassie B. Saunders, wife of R. L. Saunders of the Texas Co., and one of the largest tankers ever built at the Quincy yard of the Bethlehem Steel Co. has recently been launched. A 36,282-ton tanker, it is the first merchant vessel launched at Quincy since 1942 and the largest merchant vessel ever built there.



NEW MILL: New roughing stand of Superior Steel's new continuous hot mill is a three-high 29 x 40-in. universal stand built by Lewis Foundry & Machine Div., Blaw-Knox Co. It is driven through a 2:3:1 reducer by a 2000-hp, 180-rpm, 2200-v synchronous motor. Vertical edging rolls are run by a 300-hp, 660-v dc motor. High pressure descaling is provided by a 2500 psi, 270 gpm system.



Germans Use Scrap Pipe From War Ruins for A New Industry

ABOVE: Old gas pipe taken from Berlin ruins becomes a chair within 24 hr. Here workmen are shown dismantling pipe lines in a bombed out section of the city.



ABOVE: Men at the Witt factory cut the pipe to specified lengths, straighten, count and stock it in the firm's storeroom.

o o o

LEFT: After the pipe is bent to the proper forms, welders assemble the frames by welding and joining pieces and sections.



o o o

RIGHT: After the frame has been assembled, it is derusted and painted. Here an upholsterer is shown adding the finishing touches. Chairs find largest market in schools, hospitals and professional men's offices.



Underground Mine Test to Determine Feasibility of Producing Gas from Coal

Birmingham

• • • Underway near here in the Pratt Seam is a \$½ million experiment to determine if coal burned underground will produce a gas from which synthetic gasoline and oil can be made economically.

The experiment, second of two, is being conducted at Gorgas on coal mining property of the Alabama Power Co. This test, like the first, is being conducted jointly by the Alabama Power Co. and the U. S. Bureau of Mines.

The sponsors hold that millions of tons of thin seam coal could be utilized without prohibitive costs if the experiment proves successful.

The present test began Mar. 18 when a seam of coal, averaging about 42 ins. thick and lying 130 to 170 ft. below the surface, was ignited by a thermite bomb. Reinforced shafts had been drilled to allow the blowing of air, oxygen

and steam over the burning bed. It is the hope of engineers to control the characteristics of gas produced by varying the amounts of air, oxygen and steam used.

When operations are ended, the coal area will be flooded to cool the residue for examination. En-

tries will be driven to determine whether coke has been left in large quantities and to study effect of the combustion on strata overlying the burned coal bed.

Some gas was obtained in the first experiment that started Jan. 21, 1947. This second and much more extensive, for which Alabama Power has made available 100 acres of coal land, will be continued until all possible findings have been obtained.

Britain Lists Economic Objectives for the Year

London

• • • Britain's economic objectives for the coming year are detailed in a document, "Economic Survey for 1949," presented to Parliament by Sir Stafford Cripps, Chancellor of the Exchequer. It lays down four objectives which "stand out as paramount for 1949":

(1) A major effort must be made to expand still further the sale of British goods in

Canada and the United States.

(2) The country must continue its exertions to expand further its steadily rising production, especially in the key industries of coal, steel, textile and agriculture.

(3) The search for ways of bringing down costs, particularly of exports, and of maintaining and improving the quality of British products must be continued.

(4) The battle against inflation must continue to be fought with every possible weapon.

Construction Steel . . .

• • • Fabricated steel awards this week included the following:

- 1100 Tons, Virginia, Transmission tower for Virginia Electric Co. through Stone & Webster Engineering Corp., Boston to American Bridge Co., Pittsburgh.
- 1000 Tons, East Boston, Mass., connection to new expressway through J. A. Singarella Co., Boston, to Phoenix Iron Co., Phoenixville, Pa.
- 550 Tons, Evanston, Ill. Addition to high school gymnasium through Peter Hamlin Construction Co., Chicago, to Wendnagle Co., Chicago.
- 520 Tons, Denver State Highway Bridge U G-004-1 through Western Paving Construction Co., Omaha, to American Bridge Co., Pittsburgh.
- 400 Tons, Salem, Mass., New England Power Co., turbine pedestals to American Bridge Co., Pittsburgh.
- 450 Tons, Lewistown, Pa., Lewistown Hospital, to Bethlehem Fabricators, Inc., Bethlehem.
- 315 Tons, Denver State Highway Bridge U G 1-90-4 to E. Burkhardt & Sons Co., Denver.
- 260 Tons, New York, Home for Aged & Infirm Hebrews of N. Y., to Grand Iron Works, New York.
- 180 Tons, Harrisburg, Pa., auditorium for Roman Catholic hospital addition, to Anthracite Bridge Co., Scranton, Pa.
- 170 Tons, Skokie, Ill., highway bridge section 263-099-1-15D through Arcol Midwest Corp. to American Bridge Co., Pittsburgh.
- 130 Tons, Parlin, N. J., photo products plant,

to Bethlehem Fabricators, Inc., Bethlehem.

• • • Fabricated steel inquiries this week included the following:

- 2160 Tons, Island Heights, N. J., bridge, due Apr. 6.
- 155 Tons, Ayer, Mass., steel pony truss bridge and bituminous macadam approaches. Daniel D'Onfro's Son, Leominster, Mass., low bidder.
- 125 Tons, Holmesdale, Pa., Wayne County Memorial Hospital, due Apr. 1.
- 100 Tons, Drexel Hill, Pa., Delaware Co. Hospital, due Apr. 1.

• • • Reinforcing bar awards this week included the following:

- 8500 Tons, Washington, D. C., General Accounting Building, through John McShain, Philadelphia, to Bethlehem Steel Co., Inc., Bethlehem.
- 550 Tons, Embreeville, Pa., male and female wards for state hospital, to McCloskey & Co., Philadelphia.
- 500 Tons, Philadelphia, Maximum Security Building, Philadelphia State Hospital, through Wark & Co., Philadelphia, to Bethlehem Steel Co., Inc., Bethlehem.
- 450 Tons, Little Pine Creek, Pa., flood control and dam, through Lycoming Construction Co., Williamsport, Pa., to Bethlehem Steel Co., Inc., Bethlehem.
- 300 Tons, Hinsdale, Ill., high school, previously reported E. H. Marhoefer Co., Chicago, low bidder, contract has now been let through Marhoefer to Ceco Steel Co., Chicago.

150 Tons, Milwaukee, Wis., factory for Continental Can Co., through Clueg & Smith Co., Milwaukee, to Ceco Steel Products, Chicago.

• • • Reinforcing bar inquiries this week included the following:

- 6770 Tons, Coulee Dam, Wash., Bureau of Reclamation, Coulee Dam, Spec. 2603, bids to Apr. 15.
- 900 Tons, Indianapolis, Ind., veterans hospital, J. L. Simmons Co., Chicago, low bidder.
- 395 Tons, Los Angeles, bridges for overcrossings over Santa Ana Parkway and inlet ramp at Los Angeles St., California Div. of Highways, Los Angeles, bids to Apr. 14.
- 140 Tons, Hammond, Ind., laboratory for Standard Oil Co. of Ind., previously reported, has been abandoned.
- 125 Tons, Oakland, Calif., railroad bridge, Oakland Harbor, San Francisco District Corps of Engineers, Ser. Eng-04-203-49-14, bids to Apr. 12.
- 100 Tons, Prineville, Ore., Ochoco Dam repairs, Bureau of Reclamation, Bend, Ore., Spec. 2614, bids to May 3.

• • • Railroad car awards and inquiries this week included the following:

Milwaukee R. R. has cancelled 1000 boxcars to be built this year in their own shops. Northern Pacific R. R. has ordered 200 75-ton ore cars from the Northwest Improvement Co. The Bangor Aroostook R. R. has ordered 100 50-ton gondolas, from Magor Car Co. The Northwestern R. R. has purchased 43 Diesel electric freight locomotives from the Electromotive Div. of General Motors Corp. Northwestern also purchased 7 switchers from Baldwin Locomotive Co. and 4 Diesel switchers from Fairbanks-Morse Co.

Chrysler Introduces New Postwar Cars to Public

Detroit

• • • Featuring more than 50 engineering changes and a higher compression engine, the new postwar Chrysler models have been introduced to the public. The new Plymouth car, also sold by Chrysler dealers is currently being introduced.

Many of the engineering changes have already been described. (IRON AGE, Jan. 20, Feb. 4, Mar. 3.) The new Chrysler cars have 4 in. longer wheelbase but shorter overall length. Headroom has been increased and rear doors are hung from the center post. The windshield area has been increased 24 pct.

The new grille features two heavy chromium-plated bars sweeping across the front end of the car and curving around the fenders. Chrome fender moldings are specified. The front fender molding extends from the forward part of the fender across the front door to a point beneath the door handle. There is a skirt molding on the front fender and a stone shield on the rear fender. Front bumpers are wrap-around type and rear bumpers are recessed into the fenders.

The starter button has been eliminated through the use of a combined ignition and starter switch operated by the ignition key.

In the six-cylinder Chryslers the compression ratio has been increased from 6.7 to 7.1. In the eight-cylinder line, the compression ratio has been boosted from 6.7 to 7.25.

Cycle-bonded brake linings will be used. Brake drums are heavier and carry heavier ribs. A new central steering system with reversed caster is used.

Chrysler "Prestomatic" fluid drive transmission permits clutchless driving. The transmission has only two forward speed ranges. In each range the gears shift automatically from one speed to the other as the car gains or loses momentum.

New all-nylon fabric will be used on some Chrysler models and nylon-faced fabric on others to

**COULD
ANYTHING BE
MORE CONVINCING
THAN YOUR OWN
EXPERIENCE?**

Then give HERC-ALLOY the toughest chain job in your plant. Our asking for this test reflects the confidence given us by HERC-ALLOY service records from industry's leading plants.



HERC-ALLOY is America's *first* and *safest* steel chain. For slings or other applications HERC-ALLOY Steel Chain will prove efficiency, safety and economy can go hand-in-hand.

COLUMBUS McKINNON
CHAIN CORPORATION
(Affiliated with Chisholm-Moore Hoist Corporation)

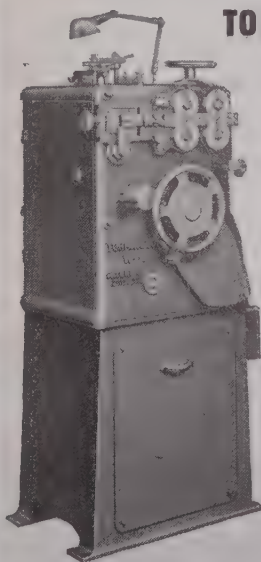
GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.
SALES OFFICES: NEW YORK • CHICAGO • CLEVELAND • SAN FRANCISCO
Other Factories at Angola, New York, St. Catharines, Ontario and Johannesburg, S. A.

Can your Spring
coiler make this?

TORSION SPRING

One end right hand — One end left hand

It's not as hard as it looks with a TORRINGTON SPRING COILER



Torrington's W-11 Spring Coiler

Tricky spring making jobs have a habit of ironing themselves out in a hurry when there's a Torrington Spring Coiler on deck to lend a helping hand. That's because these superior machines are so *versatile*! Their ability to turn out the most exacting spring designs with *speed, accuracy and economy* is an old story to professional springmakers everywhere! That *right hand-left hand* torsion spring, shown above, is just another typical example of the kind of tricks these Torrington Spring Coilers have up their clever sleeves!

For detailed information on this torsion spring or any other complex spring problem, just drop a line to our Sales Department.

THE TORRINGTON
MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT

supplement broadcloth and fabric materials.

Changes in the new Plymouth, generally speaking, follow the new Chrysler engineering and styling. Six models are being built on a 118 in. wheelbase. A 2-door sedan, 3-passenger coupe and the suburban will be built on the 111 in. wheelbase.

New Officers Elected

Pittsburgh

• • • Willard F. Rockwell, Sr., chairman of the board of Rockwell Mfg. Co., Pittsburgh, and his son, Willard F. Rockwell, Jr., president of the company bearing their name, were elected to the board of directors of Acro Switch Co., formerly the Arco Electric Co., Cleveland, manufacturers of rolling spring switches, relays and thermostats. The company was purchased in December by a group of Pittsburghers headed by the younger Mr. Rockwell.

F. G. McCloskey of Euclid, Ohio, was named president of the company. In addition to Mr. McCloskey and the Rockwells, other Acro directors are Arthur F. Kroeger of New York and Frank P. Maxwell of Columbus, Ohio.

Mr. McCloskey announced immediately the appointment of John H. J. Pearce as sales manager. The Acro Switch Co. employs 150 men and women. Company headquarters, plant and research facilities are located in downtown Cleveland.

ISIS Names Committee

Washington

• • • David C. Holub, of the Holub Iron & Steel Co., Akron and Youngstown, has been appointed chairman of the balers' committee of the Institute of Scrap Iron & Steel, Inc., by Edward L. Solomon, of Pittsburgh, who is president.

Philip Smith, of Joseph Smith & Sons, Washington, has been named vice-chairman of the committee.

Among the objectives of the committee this year are revision of Dept. of Commerce specifications for bales and a conference with consumers to develop broader demand. Research into the metallic value of hydraulic-compressed bales in relation to other grades of scrap may be undertaken.

Dennis Will Talk On Machine Gas-Cutting

Coatesville, Pa.

• • • Raymond M. Dennis, manager of fabrication, By-Products Steel Co., division of Lukens Steel Co., Coatesville, Pa., will be a featured speaker at the tenth annual Ohio Welding Conference at Ohio State University, Columbus, on Thursday, Apr. 7.

Mr. Dennis will discuss "Machine Gas-Cutting Procedures," illustrating his talk with stereopticon slides showing some of the more than 50 specialized gas-cutting machines in operation at By-Products plants. These vary from single-torch radiographs to 22-torch oxygraphs, and include pantagraphs, travographs, and camographs.

Mr. Dennis also will relate how this equipment permits the making of circular shapes with diameters from 2 to 200 in. and other steel plate forms for virtually any industrial requirement, up to about 25 in. thick.

Makes New Drum Mover

Buffalo

• • • Kist Machine Co. has virtually completed retooling for an improved 3-wheeled carrier to handle drums and barrels without manual exertion. The device, with a load capacity of 850 pounds, picks up a barrel, carries it upright and deposits it without its being touched by human hands. Charles F. Ernst, inventor of the Ernst Drumobile, said the carrier was redesigned to eliminate costly parts and increase its efficiency. The old model was used by a number of plants during the war, including the Ford Motor Co. at River Rouge.

GM Again Wins Award

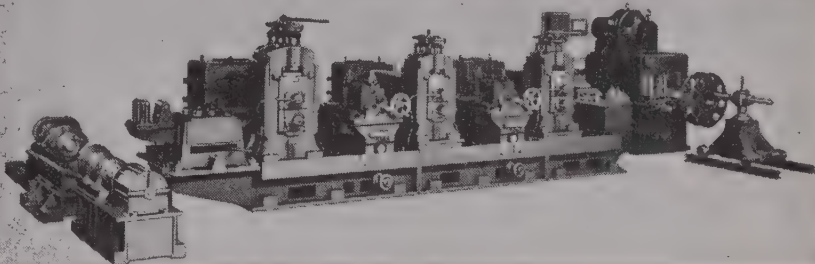
Detroit

• • • General Motors has won the industrial award of the National Safety Council for the fifth time. GM was given the Council's award of honor for 1942, 1943, 1944 and 1947.

GM's company-wide accident frequency rate in 1948 per million manhours worked was 3.16, an improvement of 25 pct over the 1947 record. Seven GM plants went through 1948 with no lost-time accidents.

2000 FEET
PER MINUTE

On the job in
Western New York!



TORRINGTON'S NEW, HIGH SPEED FLAT WIRE MILL

- ★ Individual motor drive for each flattener stand!
- ★ Automatic adjustable constant tension on pay-off and winder!
- ★ All rolls in pre-loaded precision type bearings!
- ★ Driven edging rolls after each stand except finishing stand!
- ★ Magnetic gauges for continuous gauging of wire thickness and width!
- ★ External coolant system for work and rolls!
- ★ Internal cooling on flattening rolls!
- ★ All gearing totally enclosed and running in oil!

This tandem flat wire rolling and edging equipment produces flat, square or rectangular shaped wire from round or oval hot rolled rod or wire. In Torrington flat wire mills, the metal passes successively from the pay-off through breakdown rolls, grooved edging rolls and final finishing rolls onto a winder. Magnetic gauges measure the wire between finishing rolls and winder.

Precision production to thickness tolerances as exacting as .0025" and to .001" on the width is possible with Torrington Flat Wire Rolling and Edging Equipment. This unusually high degree of accuracy is the result of 60 years experience in the design and construction of auxiliary mill equipment.

Call or write Torrington today for more information
and name of nearest Torrington representative.

The **TORRINGTON**

MANUFACTURING COMPANY TORRINGTON, CONNECTICUT

DESIGNERS AND BUILDERS OF MILL MACHINERY FOR OVER 60 YEARS



Bureau Reports Tool And Diemakers' Earnings

New York

••• An average wage of \$1.85 per hour was paid to tool and diemakers in the machine tool accessories industry in New York City and the Newark-Jersey City area during December 1948, according to results of a survey recently conducted by the Bureau of Labor Statistics, of the U. S. Dept. of Labor. Robert R. Behlow, regional director for the bureau, pointed out that the average wages in these two areas were very close, with \$1.86 in New York City and \$1.84 in the Newark-Jersey City area.

More than one out of three tool and diemakers in these two areas earned over \$2.00 per hour in December 1948. In other occupations in the machine tool accessories industry averages for class A engine lathe operators were \$1.73 in New York City and \$1.64 in the Newark-Jersey City area. Class A grinding machine operators earned \$1.62 and \$1.53, respec-

tively, on the average. Average earnings in the lowest paid job studied, janitors, were 99¢ in New York City and 94¢ in the Newark-Jersey City area.

From December 1947 to December 1948 all occupations for which comparable data were available showed an increase in wage rates except in the case of class A milling machine operators in the Newark-Jersey City area. The greatest increase reported was 21¢ per hour for production machinists and class A grinding machine operators in New York City. No decreases were reported in either area. Most establishments studied offered plant workers 6 paid holidays per year, 1 week's paid vacation after 1 year's service, and 2 weeks' paid vacation after 5 years' service.

This survey was conducted in 32 representative plants with a total employment of 1058 in New York City and the Newark-Jersey City area. In the figures reported only straight time and incentive wages are covered; premium payments for overtime and late shifts are excluded.

Sees Need for Gray Iron Products Handbook

Cleveland

••• Requests for issuance of a gray iron products handbook for general distribution among users of gray iron products, including engineers and designers, were discussed at a joint meeting of the technical and handbook committee of Gray Iron Founders' Society at a meeting here.

The group approved an outline of the book prepared by C. O. Burgess, technical director of the society. The handbook will be valuable to designers and specification engineers in selecting materials for the design of machinery and equipment and will constitute a compendium of all available authoritative information on gray iron, according to a GIFS announcement.

Other matters discussed at the meeting included activities of the society in encouraging and assisting in the development of nodular graphitic iron.

Members attending the meeting were C. R. Culling, Carondelet Foundry Co., St. Louis; E. B. Sherwin, Chicago Hardware Foundry Co., North Chicago; J. S. Vanick, International Nickel Co., Inc., New York; James Bowers, American Cast Iron Pipe Co., Birmingham, and Francis McGuire, Sibley Machine & Foundry Co., South Bend, Ind.

Holds Annual Meeting

Detroit

••• More than 75 sales and service representatives of the Udy-lite Corp. met recently in Detroit for the Annual Sales Meeting, which was conducted by L. V. Nagle, vice-president in charge of sales.

Mr. Nagle declared at the meeting that 1948 represented the greatest year in Udy-lite history, and with new products and other developments he expected 1949 to show a substantial increase over 1948 regardless of the general trend in business toward lower sales.

The 3-day meeting covered all phases of Udy-lite business operations, sales, advertising, service, credits, and was finalized with the Udy-lite Frolics, a show conducted each year from talent at the Udy-lite factories.

McDANEL
High Temperature
PORCELAIN SPECIALTIES

Made to Your
SPECIFICATIONS

Precision made to meet your laboratory needs, McDanel High Temperature Porcelain Specialties are outstanding in quality and in performance. From the making of the raw materials to the final testing of the product before shipment, McDanel Porcelain Specialties undergo production control at each step of the way. This is your assurance of long, dependable service.

OTHER McDANEL PRODUCTS

- Non-spalling, non-blistering gas tight Combustion Tubes
- High Temperature Zirco Tubes
- Self Cooling Combustion Tubes
- Refractory Porcelain Specialties

in stock or designed to meet your needs.

Specify McDanel High Temperature Porcelain Specialties from your Supplier or write us about your specific problem today.

McDANEL REFRACTORY PORCELAIN CO.
BEAVER FALLS, PENNA.

Conference Planned To Discuss Specifications

St. Louis

• • • William Rosenthal, the Purdy Co., St. Louis, has been appointed chairman of the specifications committee of the Institute of Scrap Iron & Steel Inc., by Edward L. Solomon, of Pittsburgh, who is president.

Joseph S. Summer, Summer & Co., Columbus, O., has been named vice chairman of the committee.

Inasmuch as official specifications of the Dept. of Commerce on ferrous scrap have not been revised for a number of years, it is probable that the committee will ask the department for a conference of consumers, suppliers, and dealers, to bring specifications up-to-date.

The most modern specifications on scrap are those written by the former OPA.

Offers Tooling Course

Hannibal, Mo.

• • • An advanced instruction course in carbide cutting tool practice is being offered at the Wendt-Sonis Co. training school here. The course, which is given without charge, is one week in length and is set up to provide anyone working with carbide tools with information on latest developments and applications.

Practical applications cover various turning operations on soft and heat treated steel, threading, boring, milling, counterboring, reaming, drilling, and many other shop applications. The training is open to toolroom foremen, factory superintendents, machinists, foremen and production supervisors.

CF&I Buys Billet Furnace

Pittsburgh

• • • Colorado Fuel & Iron Corp. has contracted for a new billet heating furnace for the rod mill at its Pueblo, Colo., plant. The contract, awarded to Rust Engineering Co., Pittsburgh, calls for a double-fired unit with a top outlet for waste gases. Designed for a maximum temperature of 2500°F, the furnace will heat 60 tons of 24-ft billets per hr. Effective heating length will be 65 ft. Inside width is to be 26 ft and outside length 73 ft.

new!

F. E. I. SETTING for Galvanizing Furnaces

F.E.I. Builds:

Open Hearth Furnaces; Soaking Pits; Continuous Bloom, Billet and Slab Heating Furnaces; Direct Fired Cover Furnaces for sheet and coil annealing; Salt Descaling Furnaces for stainless steel sheet, bar and other products; Heat Treating Furnaces for every use; Galvanizing Furnaces for tubes, sheet and metalware.

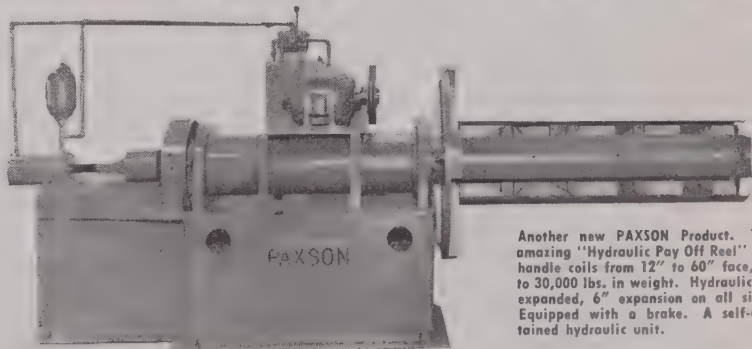
In a large steel plant on a pipe galvanizing furnace where the expected life of the kettle was 20,000 tons of galvanized pipe, this new setting produced 70,000 tons before the kettle was replaced. For the same tonnage no repairs whatever were required for the setting until a new kettle was installed. There was a pronounced reduction in the overall fuel used per ton because this new setting allows for the minimum of fuel during the idling period which usually occurs for about 2 days every week. Details of this setting will be cheerfully furnished upon request.

U. S. PATENTS—2,446,642; 2,403,431; 1,913,170.
OTHER PATENTS PENDING.



FURNACE ENGINEERS, INC.
1554 WEST LIBERTY AVE., PITTSBURGH 26, PA.

PAXSON



Another new PAXSON Product. This amazing "Hydraulic Pay Off Reel" will handle coils from 12" to 60" face, up to 30,000 lbs. in weight. Hydraulically expanded, 6" expansion on all sizes. Equipped with a brake. A self-contained hydraulic unit.

Other products manufactured by Paxson Machine Co. are:
COILERS, SLITTERS, SCRAP BALLERS

MAIL COUPON BELOW FOR ADDITIONAL INFORMATION.

PAXSON MACHINE CO.
SALEM, OHIO

Please send additional information on: Pay Off Reels ☐

Coilers ☐ Slitters 18"-84" Capacity to 11 ga. ☐ Scrap Ballers ☐

FIRM TITLE
NAME
ADDRESS STATE
CITY

Gap in Export Machine Tool Business Laid to Dollar Shortages

••• Slowness of ECA machine tool orders in reaching United States machine tool builders appeared in a new light last week when ECA Administrator Paul G. Hoffman, in a statement, revealed that: Dollar shortages in Europe preclude unrestricted granting of import licenses and consequent expenditures.

Demand for American machinery and equipment is greater than can be met by the combined European free dollars and ECA dollars. Participating countries can, therefore, approve only a percentage of the application of their nationals for the allocation of ECA dollars for such purchases and a large portion of the requirements must be satisfied through intra-European trade.

With the exception of a few dollar allocations for procurement from Canada, all ECA dollar procurement for machinery and equipment is expended in the United States.

The second annual program submitted by the Organization for European Economic Cooperation (OEEC) in Paris proposes \$250 million increase in procurement of United States machinery and equipment, which will provide for imports of American machine tools nearly 50 pct higher, or \$75 million against \$50 million last year. New fiscal year begins June 1.

Mr. Hoffman's statement also pointed out that in the early months of ECA operation, a high priority was placed on the shipment of food, fuel and raw materials, but since the middle of November, authorizations for industrial items have consistently exceeded those for food and agricultural commodities. This trend, Mr. Hoffman emphasized, will continue.

OEEC's proposal to increase imports of United States machine tools comes at an appropriate time for industry, since current new

Demand For U. S. Tools Is Heavy in Europe; New Program Larger

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order volume is the subject of a number of conflicting reports.

Reliable sources in the trade reported this week that in some sectors of the domestic market it is beginning to look like the major companies have done the bulk of their buying for the time being and, in general, that only the small companies are still in the market. Detroit is the week's exception.

At the same time, both ECA business and domestic new orders are very unevenly distributed. Some segments of the industry are busy, but others are in the doldrums, notably some New England companies.

One major producer reported this week that as domestic volume decreases, it is offset by an increase in foreign volume. At the moment, France is the bright spot for European orders.

In Detroit, the status quo on machine tools continues, but the rumblings that may bring a sizable volume of new orders are increasing daily. Indications are already available that the new Chrysler-Dodge tooling problem, when it is released, will be substantial. Most sources believe a new engine is involved.

Quotations requested by Detroit Gear are reported to be for a new automatic transmission program. Some sources think this tooling may be required for a new Studebaker transmission unit within 60 to 90 days.

There have been some recent quotations for Buick and it is possible that not all the tooling for the new GM research center has been placed.

Biggest question mark at the moment is Ford and Lincoln. Some

machine tool sources are convinced that a sizable program from L-M Division is almost a certainty before many more months have passed.

Some New England machine tool builders take issue with current trade reports on the state of business, saying that, so far as they are concerned, business is not improving and reports to the contrary are visionary.

On the other hand, a few New Englanders report business has shown a slight upward curve so far this year.

Generally speaking, 1948 was a lean year with small, medium and large machine tool companies. Operating schedules, payrolls and cash reserves were revised. Since Jan. 1, some further revisions have been necessary and at the moment it appears the industry is in for more headaches.

Present uncertainty regarding taxes, restrictions on raw materials and business conduct and other complicating questions are having their effect on the machine tool industry. Nevertheless, it is reasonably certain machine tool builders can go along as they are for some time.

In Washington, it was reported this week that it is anybody's guess as to how much money the government has put into the machine tool industry, steel, rubber, autos, aluminum and aircraft and a number of other parts of the national industrial structure. In other words, the government has no idea what part of the nation's industrial capacity and equipment it can control and reclaim in an emergency.

It has taken nearly 2 months of investigation in all federal agencies that should have the information to find this out. Some facilities are rented to private firms. The government knows what those plants cost originally, but not how much they are worth now. Other facilities have been sold on long term mortgages.

Sunbeam STEWART

THE BEST INDUSTRIAL FURNACES MADE

Regardless of whether you heat treat in small quantities or continuous production, Sunbeam Stewart engineers are well qualified to recommend the correct furnaces to meet your requirements.

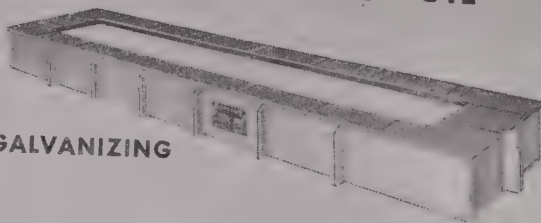
As a division of Sunbeam Corporation we have the opportunity of working with our furnaces in the production of Sunbeam appliances, lawn sprinklers, sheep shears, animal clippers, etc. In manufacturing our own products we must contend with practically every heat treating problem faced by industry—a position unique in the furnace manufacturing field.

This experience with our own furnaces in both small or large volume production enables us to render a service to you far beyond other manufacturers. That is one reason why Sunbeam Stewart Furnace installations have been so successful. They are based not only on furnace engineering ability, but on practical experience under actual operating conditions. We have learned through actual experience the factors that give longest furnace life . . . greatest production . . . best quality . . . and lowest operating cost.

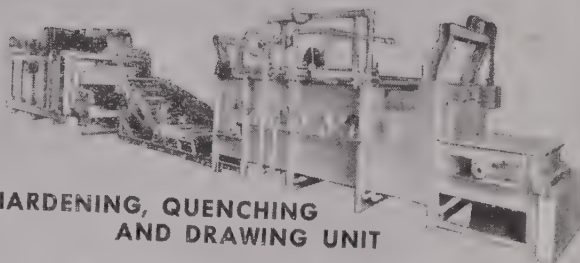
Our highly trained technical staff of furnace engineers, who for over 50 years have built furnaces for the leading companies throughout the United States and abroad, are qualified to recommend the correct type of furnace to meet your requirements.

A letter, wire or 'phone call will promptly bring you information and details on Sunbeam Stewart Furnaces, either units for which plans are now ready or units especially designed to meet your needs. Or, if you prefer, a Sunbeam Stewart engineer will be glad to call and discuss your heat treating problem.

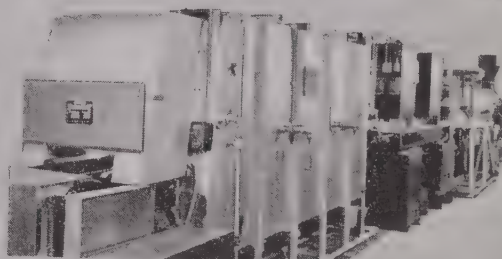
THERE IS A SUNBEAM STEWART
INDUSTRIAL FURNACE FOR EVERY NEED
GAS • ELECTRIC • OIL



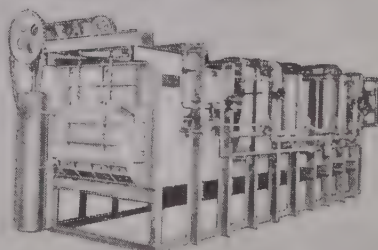
GALVANIZING



HARDENING, QUENCHING
AND DRAWING UNIT



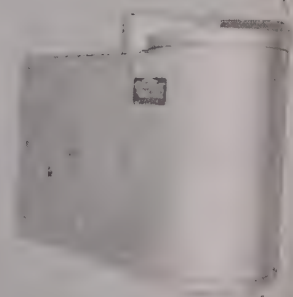
FURNACE BRAZING



PORTABLE OVEN FURNACE

FREE Vest-Pocket Heat Treating Data Book. MAIL today.
CHECK for information on furnaces to meet your needs.

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| ☐ Atmosphere-controlled | ☐ Electric high speed | ☐ Oven |
| ☐ Bonderizing | ☐ Electric pre-heat | ☐ Pot |
| ☐ Brazing furnace | ☐ Forging | ☐ Recirculating |
| ☐ Car bottom | ☐ Galvanizing | ☐ Rivet heaters |
| ☐ Case hardening | ☐ Gas carburizing | ☐ Rotary hearth forge |
| ☐ Combination | ☐ Gas nitriding | ☐ Soldering iron heaters |
| ☐ Complete toolroom | ☐ High speed steel | ☐ Tempering |
| ☐ Continuous production | ☐ Metal melting | ☐ Tool hardening |
| ☐ heat treat line | | |



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COMPANY _____

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SUNBEAM STEWART INDUSTRIAL FURNACE DIVISION of SUNBEAM CORPORATION

(Formerly CHICAGO FLEXIBLE SHAFT CO.)

Chicago Office: Dept. 110, 4433 Ogden Ave., Chicago 23—New York Office: 322 W. 48th St., New York 19—Detroit Office: 2349 E. Grand Blvd., Detroit 8
Canada Factory: 321 Weston Rd., So., Toronto 9

Trade Buzzing With Talk of 10 pct. Wage Demand By Workers

New York

• • • Some eastern refineries have learned on an unofficial basis that the mine and smelter workers will press demands for a wage increase, together with fringe demands. Although the information is necessarily incomplete at this time, it appears that the demand will be for a 10 pct increase, about 15¢ per hr.

Refinery wage contracts do not end until June 30, so developments in the general industrial picture and in the metal markets will have an important effect on what demands are ultimately made. Since refinery officials have not been approached generally on this matter, some members of the industry believe that this may be only a trial balloon to determine the industry's reaction. There is no news yet as to demands on brass mills, whose contracts come up for renewal in April.

Major copper producers have sold out their April copper tonnage and will not open their books for May until the end of March or early in April. Sellers who book advance tonnage report general apathy about May and June bookings, attributing this to a general policy of reduced inventories. Since inventories are being generally held at the 30-day level, it may develop that with the approach of that period for May and June deliveries, orders will be received to take up full production.

It is learned that Cerro de Pasco Copper Co. has placed into production a refinery at Oroya, Peru, near Lima. At present it is producing about 1800 tons of cathodes per month. Copper is available

New Copper Refinery In Peru Will Challenge Chile In S. American Market

o o o

to produce up to 2000 tons a month.

In another few months, facilities will be available to cast shapes. Production of this plant will be in a position to compete with Chilean producers in serving the South American market.

The demand for Prime Western zinc is still very heavy for galvanizing requirements. Demand is lighter for High Grade and Special High Grade. The probability of a lower price for zinc at an early date is somewhat remote due to the fact that prices of other grades are tied to Prime Western as a base.

While heavy demand for galvanized sheets and pipe remains there is not much prospect of a lower zinc market. Nevertheless, many consumers have been anticipating some such action. It is pointed out that the advance in the zinc price since the end of the war was much less than that of lead, which exceeded 300 pct.

Reductions in the price of lead have not resulted in a heavier order volume. Some consumers have been expecting further reductions. The cause of the falling lead market is quite apparent from the report of shipments of replacement batteries during February, only 821,000 units compared with 1,243,000 units in January and 2,254,000 units a year

ago. While this low battery shipment rate continues, lead consumption will necessarily remain low.

What all factors in the metal industry are fearful of is the general return of buyers to the market on a normal basis. If industrial activity were to continue high, such a development may be expected to tighten up the markets again.

Foundry buying of ingots continues at a very low level. This continues to reduce the interest of ingot makers in scrap metals. Refineries, too, are largely inactive in the scrap copper market, and have reduced their buying prices.

Refineries are now paying only 17¢ per lb for No. 1 heavy copper and wire. Most refineries are out of the market at any price. Ingot makers are also out of the market. Dealers' buying prices for copper and brass grades were reduced by 1½¢ to 2¢ last week. There were no aluminum ingot makers buying scrap. Dealers reduced principal grades of aluminum scrap by ½¢ last week.

For the first time in months, prices of nickel and monel scrap grades have been reduced in the general scrap inactivity. Dealers' buying prices were reduced last week by 2¢ per lb.

There is a growing feeling among nonferrous producers that they might be the last to feel it when the bloom is off the market. They are keenly interested in the current policy of inventory conscious consumers of their products. If they could get a better picture of what is in store for their customers, they feel that they would have a useful yardstick with which to measure their own future business.

The tendency so far has been to view the trend toward inventory reduction as a straw in the wind. But few have ventured to predict in what direction or how far it would blow.

Nonferrous Metals Prices

	Mar. 16	Mar. 17	Mar. 18	Mar. 19	Mar. 21	Mar. 22
Copper, electro, Conn.	23.50	23.50	23.50	23.50	23.50	23.50
Copper, Lake, Conn.	23.625	23.625	23.625	23.625	23.625	23.625
Tin, Straits, New York	\$1.03	\$1.03	\$1.03	\$1.03	\$1.03	\$1.03
Zinc, East St. Louis	17.50	17.50	17.50	17.50	17.50	17.50
Lead, St. Louis	17.80	17.80	17.80	17.80	17.80	17.80

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, 10,000 lb, freight allowed	17.00
Aluminum pig	16.00
Antimony, American, Laredo, Tex.	38.50
Beryllium copper, 3.75-4.25% Be	
dollars per lb contained Be	\$24.50
Beryllium aluminum 5% Be, dollars per lb contained Be	\$52.00
Bismuth, ton lots	\$2.00
Cadmium, del'd	\$2.00
Cobalt, 97-99% (per lb)	\$1.65 to \$1.72
Copper, electro, Conn. Valley	23.50
Copper, lake, Conn. Valley	23.625
Gold, U. S. Treas., dollars per oz.	\$35.00
Indium, 99.8%, dollars per troy oz.	\$2.25
Iridium, dollars per troy oz.	\$105 to \$110
Lead, St. Louis	17.80
Lead, New York	18.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex.	20.50
Magnesium, sticks, carlots	34.50
Mercury, dollars per 76-lb flask, f.o.b. New York	\$88 to \$94
Nickel, electro, f.o.b. New York	42.93
Palladium, dollars per troy oz.	\$24.00
Platinum, dollars per troy oz.	\$72 to \$75
Silver, New York, cents per oz.	71.50
Tin, Grade A, New York	\$1.03
Zinc, East St. Louis	17.50
Zinc, New York	18.193
Zirconium copper, 10-12 pct Zr, per lb contained Zr	\$12.00

Remelted Metals

Brass Ingot

(Published prices, cents per lb delivered, carloads)

85-5-5-5 ingot	
No. 115	17.50*
No. 120	17.00*
No. 123	16.50*
80-10-10 ingot	
No. 305	25.25
No. 315	24.25
88-10-2 ingot	
No. 210	32.50
No. 215	29.50
No. 245	21.00*
Yellow ingot	
No. 405	14.50*
Manganese bronze	
No. 421	22.50
* F.o.b. Philadelphia.	

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys	
0.30 copper, max.	24.25
0.60 copper, max.	24.00-24.50
Piston alloys (No. 122 type)	20.75-21.00
No. 12 alum. (No. 2 grade)	19.75-20.50
108 alloy	20.75-21.00
195 alloy	21.25-21.75
13 alloy	24.00-24.50
AXS-679	20.75-21.00

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95 pct-95 1/2 pct	22.50-23.00
Grade 2—92 pct-95 1/2 pct	20.75-21.25
Grade 3—90 pct-92 pct	20.50-21.00
Grade 4—85 pct-90 pct	20.00-20.50

Electroplating Supplies

Anodes

(Cents per lb, freight allowed, in 500 lb lots)

Copper	
Cast, oval, 15 in. or longer	40%
Electrodeposited	34%
Rolled, oval, straight, delivered	37.34
Ball anodes	38%
Brass, 80-20	
Cast, oval, 15 in. or longer	35%
Zinc, oval, 99.99	
Ball anodes	20.50
Nickel 99 pct plus	
Cast	59.00
Rolled, depolarized	60.00
Cadmium	\$2.10
Silver 999 fine, rolled, 100 oz. lots, per troy oz, f.o.b. Bridgeport, Conn.	79

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	46.00
Copper sulfate, 99.5 crystals, bbls.	9.10
Nickel salts, single or double, 100 lb bags, frt. allowed	20.00
Nickel chloride, 300 lb bbl.	24.50
Silver cyanide, 100 oz. lots, per oz.	59
Sodium cyanide, 96 pct domestic 100 lb drums	16.00
Zinc sulfate, crystals, 22.5 pct, bags	
Zinc sulfate, 25 pct, granules, bbls, frt allowed	

Mill Products

Aluminum

(Base prices, cents per pound, base 30,000 lb, f.o.b. shipping point, freight allowed)

Flat Sheet: 0.188 in., 2S, 3S, 26.9¢; 4S, 61S-O, 28.8¢; 52S, 30.9¢; 24S-O, 24S-OAL, 29.8¢; 75S-O, 75S-OAL, 36.3¢; 0.081 in., 2S, 3S, 27.9¢; 4S, 61S-O, 30.2¢; 52S, 32.3¢; 24S-O, 24S-OAL, 30.9¢; 75S-O, 75S-OAL, 38¢; 0.032 in., 2S, 3S, 29.5¢; 4S, 61S-O, 33.5¢; 52S, 36.2¢; 24S-O, 24S-OAL, 37.9¢; 75S-O, 75S-OAL, 47.6¢.

Plate: 1/4 in. and heavier: 2S, 3S, F, 23.8¢; 4S-F, 26¢; 52S-F, 27.1¢; 61S-O, 26.6¢; 24S-F, 24S-FAL, 27.1¢; 75S-F, 75S-FAL, 33.9¢.

Extruded Solid Shapes: Shape factors 1 to 4, 35.1¢ to 66¢; 11 to 13, 36.1¢ to 78¢; 23 to 25, 38.2¢ to \$1.07; 35 to 37, 45.7¢ to \$1.65; 47 to 49, 67.5¢ to \$2.41.

Rod, Rolled: 1.064 to 4.5 in., 2S-F, 3S-F, 34¢ to 30.5¢; Cold-finished, 0.375 to 3.5 in., 2S, 3S, 36.5¢ to 32¢.

Screw Machine Stock: Drawn, 1/4 to 1 1/32 in., 11S-T3, R317-T4, 49¢ to 38¢; cold-finished, 1/4 to 1 1/2 in., 11S-T3, 37.5¢ to 35.5¢; 1/2 to 2 in., R317-T4, 37.5¢ to 34.5¢; rolled, 1 9/16 to 3 in., 11S-T3, 35.5¢ to 32.5¢; 2 1/2 to 3 1/2 in., R317-T4, 33.5¢ to 32.5¢. Base 6000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in.: 2S, 36¢ to 26.5¢; 52S, 44¢ to 32¢; 56S, 47¢ to 38.5¢; 17S-T4, 50¢ to 34.5¢; 61S-T4, 44.5¢ to 34¢; 75S-T6, 76¢ to 55¢.

Magnesium

(Cents per lb, f.o.b. mill, freight allowed Base quantity 30,000 lb)

Sheet and Plate: Ma, FSA, 1/4 in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S grade 8, 58¢-60¢; 10, 59¢-61¢; 12, 63¢-65¢; 14, 69¢-74¢; 16, 76¢-81¢; 18, 84¢-89¢; 20, 96¢-\$1.01; 22, \$1.22-\$1.31; 24, \$1.62-\$1.75. Specification grade higher.

Extruded Round Rod: M, diam. in., 1/4 to 0.311, 58¢; 1/2 to 3/4, 46¢; 1 1/4 to 1.749, 43¢; 2 1/2 to 5, 41¢. Other alloys higher.

Extruded Square, Hex. Bar: M, size across flats, in., 1/4 to 0.311, 61¢; 1/2 to 0.749, 48¢; 1 1/4 to 1.749, 44¢; 2 1/2 to 4, 42¢. Other alloys higher.

Extruded Solid Shapes, Rectangles: M, in weight per ft. for perimeters of less than size indicated, 0.10 to 0.11 lb. per ft. per. up to 3.5 in., 55¢; 0.22 to 0.25 lb per ft. per. up to 5.9 in., 51¢; 0.50 to 0.59 lb per ft. per. up to 8.6 in., 47¢; 1.8 to 2.59 lb per ft. per. up to 19.5 in., 44¢; 4 to 6 lb per ft. per. up to 28 in., 43¢. Other alloys higher.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, 1/4 to 5/16, \$1.14; 5/16 to 3/8, \$1.02; 3/8 to 1/2, 76¢; 1 to 2 in., 65¢; 0.065 to 0.082, 3/8 to 7/16, 85¢; 1/2 to 3/4, 62¢; 1 to 2 in., 57¢; 0.165 to 0.219, 3/4 to 5/4, 54.5¢; 1 to 2 in., 55¢; 3 to 4 in., 49¢. Other alloys higher.

Nickel and Monel

(Base prices, cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	60	47
Strip, cold-rolled	66	50
Rods and shapes		
Hot-rolled	56	45
Cold-drawn	56	45
Angles, hot-rolled	56	45
Plates	58	46
Seamless tubes	39	30
Shot and blocks		40

Copper, Brass, Bronze

(Cents per pound, freight prepaid on 200 lb)

	Extruded Shapes	Rods	Sheets
Copper	36.78		37.18
Copper, hot-rolled		33.08	
Copper, drawn		34.28	
Low brass	38.57*	35.35	35.66
Yellow brass	37.60*	34.28	34.59
Red brass	38.92*	35.70	36.01
Naval brass	34.90	33.65	39.59
Leaded brass		29.24	
Commercial			
bronze	39.54*	36.57	36.88
Manganese bronze	38.49	36.99	43.09
Phosphor bronze, 5 pct	57.80*	56.30	56.05
Muntz metal	34.47	33.22	37.66
Everdur, Herculoys, Olympic, etc.	40.49	40.76	41.82
Nickel silver, 10 pct		47.17	44.77
Architectural bronze	33.42		
* Seamless tubing.			

Scrap Metals

Brass Mill Scrap

(Cents per pound; add 1/4¢ per lb for shipments of 20,000 lb or more)

	Heavy	Turn-ings
Copper	21 1/2	20 1/2
Yellow brass	18 1/2	18 1/2
Red brass	20	19 1/2
Commercial bronze	20 1/2	19 1/2
Manganese bronze	18 1/2	17 1/2
Leaded brass rod ends	18 1/2	

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper, wire	17.00
No. 2 copper, wire	16.00
Light copper	15.00
Refinery brass	14.50

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer)

No. 1 copper, wire	17.00
No. 2 copper, wire	16.00
Light copper	15.00
No. 1 composition	12.00-12.50
No. 1 comp. turnings	11.50-12.00
Rolled brass	11.00-11.50
Brass pipe	11.50-12.00
Radiators	10.75
Heavy yellow brass	9.50

	Aluminum
Mixed old cast	10.00
Mixed old clips	10.00
Mixed turnings, dry	9.00
Pots and pans	10.00
Low copper	15.50

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	15 1/2-16
No. 2 heavy copper and wire	14 1/2-15
Light copper	13 1/2-14
Auto radiators (unsweated)	9 1/4-9 1/2
No. 1 composition	11-11 1/4
No. 1 composition turnings	10 3/4-11
Clean red car boxes	9 1/4-9 1/2
Cocks and faucets	9 1/4-9 1/2
Mixed heavy yellow brass	7-7 1/2
Old rolled brass	8 3/4-9
Brass pipe	10-10 1/2
New soft brass clippings	14-14 1/2
Brass rod ends	10 1/2-11
No. 1 brass rod turnings	8 1/2-9

Aluminum

Alum. pistons and struts	5-5 1/2
Aluminum crankcases	7 1/2-8
2S aluminum clippings	13-13 1/2
Old sheet and utensils	7 1/2-8
Borings and turnings	4 1/2-5
Misc. cast aluminum	7 1/2-8
Dural Clips (24S)	7 1/2-8

Zinc

New zinc clippings	10 1/2-11
Old zinc	7 1/2-8
Zinc routings	5-5 1/2
Old die cast scrap	5-5 1/2

Nickel and Monel

Pure nickel clippings	20-21
Clean nickel turnings	15-16
Nickel anodes	20-21
Nickel rod ends	19-21
New Monel clippings	15 1/2-16 1/2
Clean Monel turnings	12-13
Old sheet Monel	10-11
Old Monel castings	13-14
Inconel clippings	8-8 1/2
Nickel silver clippings, mixed	6 1/2-7
Nickel silver turnings, mixed	

Lead

Soft scrap lead	10 1/2-11
Battery plates (dry)	5-5 1/2

Magnesium Alloys

Segregated solids	8-9
Castings	4 1/2-5 1/4

Miscellaneous

Block tin	82-84
No. 1 pewter	65-67
No. 1 auto babbitt	51-53
Mixed common babbitt	13 1/2-14
Solder joints	18-19
Siphon tops	50-52
Small foundry type	14 1/2-15
Monotype	13 1/2-14
Lino. and stereotype	13-13 1/2
Electrotype	11 1/2-12
New type shell cuttings	15-15 1/4
Hand picked type shells	6-6 1/2
Lino. and stereo. dross	8 1/2-9
Electro. dross	6-6 1/4

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Prices Slip Again; Trading Remains Dull

New York

••• This week trading is dull and prices are lower. THE IRON AGE scrap composite slipped 66¢ a gross ton to \$34.92 a gross ton. This was caused by a drop of \$1 a ton in the average price of No. 1 heavy melting steel at Chicago and Philadelphia. This item held on very weakly at Pittsburgh, where the tone of the market is also weak.

Price declines are general and are pretty much true for all grades. The trend is still definitely downward. How far it will go or when it will be arrested is a hard one to figure. Some steel scrap buyers are beginning to show concern for the dropping prices of scrap. While they are still out of the market, they have indicated that they would not buy even at lower quotations. In fact it has become evident that some of them do not want scrap prices to go lower. This might reflect some concern for the ratio between scrap and finished steel prices. Or it might be just a bluff.

Some sources in the trade had believed that the coal stoppage would lend some strength to the scrap market, especially on turnings. So far this definitely has not happened. This item has suffered with the rest.

In the presence of softer prices, major consumers are still out of the market on a substantial tonnage basis in all areas. This poses a real problem for brokers and dealers whose yards are filling up, with no real prospect of new business—at any price. This could change in a hurry if major consumers decide that “now is the time to buy.”

PITTSBURGH—A dismally weak tone dominates this market. The only reason many prices are not being slashed sharply is that buyers are not interested in listening to lower priced offers—so they are not made except in distress sales of small lots. Buyers are not pushing for lower prices because: (1) They don't need to buy anything now; (2) They want an orderly price decline, not a debacle; (3) If scrap prices go too low dealers may hold stocks and prices rebound when or if demand picks up. Scrap, of course, is

tied in with steel prices which may be affected by higher labor costs later this year when scrap prices may be the cushion. Sales have now established railroad heavy melting steel at a \$38 top and No. 2 dealers bundles at \$3 less than No. 2 steel.

CHICAGO—Upon appraisal of all factors: last sales, new offers, new dealers, scrap prices, etc., \$32 to \$35 is now the best representative price range for No. 1 heavy melting scrap in Chicago. New sales of turnings and borings plus dealers scrap caused these prices to slip lower last week. The sustained absence of mill interest in new orders of any appreciable size has left dealers high and dry. Most yards in this area are practically on vacation. They aren't buying or selling, except in extremely light tonnages, and they don't intend to start buying freely until they are sure they can find a home for their scrap. No railroad lists of importance closed last week. Generally these specialties are showing a wide range of prices. This is particularly true in rerolling rails. Carnegie is on a month to month buying basis and will place their April tonnages by the end of next week.

PHILADELPHIA — Consumers were still out of the market last week, and activity in scrap was at a standstill. An appraisal of the market indicates that most scrap grades are weaker by \$1. Turnings were down \$2. Mixed borings and chemical borings were unchanged. Foundry cast grades were down \$2. Low phos grades were also down \$2. The price quoted last week for rail steel wheels and coil springs was \$9 lower than warranted by market conditions.

CLEVELAND—A major consumer in the Cleveland-Valley area “averaged off” some old orders this week with some low-priced paper, which not only dropped the prices of the grades involved, No. 2 bundles and No. 2 steel, but depressed prices on some other grades as well. The expected pickup in movement of blast furnace grades as a result of the coal “holiday” has not yet materialized. Indications are that if the pits are reopened on schedule, blast furnace grades will remain in their present anemic state. While the market on all grades is very soft at the moment, mill buyers allege that it will not go much below present levels, which is an interesting prediction, considering the source.

CINCINNATI—Mills and foundries are out of the scrap market here. A few old orders for nominal tonnages are providing the only activity in a market that is very soft. Foundry orders are practically nonexistent. A limited amount of tonnage is moving from this district to other districts, but again the volume is insufficient to stimulate local buying. On appraisal, prices were weaker this week.

DETROIT—All indications point to a weaker market in Detroit again this week but with almost a complete absence of buying, price levels are difficult to determine. Some of the major classifications are holding this week but others have slipped again as the downward price movement continues apparently without interruption. Among recent developments of interest here is the gradual contraction in the spread between openhearth and low phos grades. Meanwhile, tonnages of industrial scrap being offered on the free market are increasing. Several GM lists are closing this week, it is reported.

NEW YORK—In this area prices continued to slip this week and trading is dull. No. 1 heavy melting steel slipped \$1 a ton, making the price \$26 to \$27 per gross ton. Other grades were off as much or more. Biggest drop was recorded in No. 2 bundles which skidded \$3. Price on this grade is now \$20 to \$21. Scrap is available here but brokers' buying is slowed by a lack of orders from consumers.

BUFFALO—Openhearth scrap sank another dollar and blast furnace stuff two dollars. Local dealers and brokers have pretty well completed mill orders expiring this week and no new business was anticipated before the middle of next week at the earliest. No. 1 steel at \$34 to \$35 and No. 2 at \$29 to \$30 were at about the level at which new business was expected to be done. Turnings were in abundant supply and none of the leading consumers seemed particularly interested even at the lower prices of \$20 to \$21 for borings and turnings and \$22 to \$23 for shovelings. Clean auto cast was clipped \$4 due to poor demand. Local yards were buying cast from peddlers at \$20 a net ton compared with \$40 to \$50 and more last fall.

BOSTON—Scrap prices continued to drop, with No. 1 heavy melting slipping another \$2 to \$26 to \$26.50 a new low for the move, and machine shop turnings and mixed borings and turnings hitting a bottom price of \$13 to \$14. The cast iron situation shows no change with little or no business, and dealers not able to quote a price. This is the third month of the worst condition in years in cast iron, according to dealers.

ST. LOUIS—Sales of representative tonnages of No. 1 heavy melting steel at \$33 to \$34 the previous week still influenced the market in the absence of new orders. Steel mills and foundries in the St. Louis industrial area are thinking primarily of reducing inventories and buying has been light. One mill has canceled all unfilled orders. Another is out of the market until Apr. 15. Last week bundled sheets should have been \$29 to \$30 in the St. Louis market.

BIRMINGHAM—The market undertone here is weaker with price declines general for grades on which there is any trading. Prices for openhearth grades are nominal, based on last sales of substantial tonnages.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$36.50 to \$37.00
RR. hvy. melting	37.50 to 38.00
No. 2 hvy. melting	34.00 to 35.00
No. 2 bundles	31.50 to 32.00
RR. scrap rails	40.00 to 41.00
Rails 2 ft and under	47.00 to 48.00
No. 1 comp'd bundles	36.50 to 37.00
Hand bld. new shts.	36.50 to 37.00
Hvy. steel forge turn.	34.50 to 35.00
Mach. shop turn.	23.50 to 24.00
Shoveling turn.	26.00 to 27.00
Mixed bor. and turn.	23.50 to 24.00
Cast iron borings	27.00 to 28.00
No. 1 mach. cast.	41.00 to 42.00
Mixed yard cast.	36.00 to 37.00
Hvy. breakable cast.	33.00 to 34.00
Malleable	40.00 to 42.00
RR. knuck. and cup.	42.50 to 45.00
RR. coil springs	44.50 to 45.50
RR. leaf springs	44.50 to 45.50
Roller steel wheels	42.50 to 45.00
Low phos.	39.00 to 39.50

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$32.00 to \$35.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 bundles	32.00 to 35.00
No. 2 dealers' bundles	27.00 to 28.00
Bundled mach. shop turn.	25.00 to 26.00
Galv. bundles	24.00 to 25.00
Mach. shop turn.	21.00 to 22.00
Short shov. turn.	21.00 to 22.00
Cast iron borings	21.00 to 22.00
Mix. borings and turn.	21.00 to 22.00
Low phos. hvy. forge	39.00 to 40.00
Low phos. plates	37.00 to 38.00
No. 1 RR. hvy. melt.	35.00 to 36.00
Rerolling rails	43.25 to 47.00
Miscellaneous rails	39.00 to 41.75
Angles & splice bars	40.00 to 41.00
Locomotive tires, cut.	42.00 to 43.00
Cut bolster & side frames.	39.00 to 40.00
Standard stl. car axles	56.00 to 58.00
No. 3 steel wheels	41.00 to 42.00
Couplers and knuckles	41.00 to 41.75
Rails, 2 ft and under	42.00 to 44.00
Malleable	38.00 to 39.00
No. 1 mach. cast.	41.00 to 42.00
No. 1 agricul. cast.	38.00 to 40.00
Heavy breakable cast	35.00 to 38.00
RR. grate bars	29.00 to 30.00
Cast iron brake shoes	30.00 to 35.00
Cast iron car wheels	40.00 to 42.00

CINCINNATI

Per gross ton, f.o.b. cars:

No. 1 hvy. melting	\$28.50 to \$29.00
No. 2 hvy. melting	27.50 to 28.00
No. 1 bundles	28.50 to 29.00
No. 2 bundles	26.50 to 27.00
Mach. shop turn.	18.50 to 19.00
Shoveling turn.	18.50 to 19.00
Cast iron borings	19.50 to 20.00
Mixed bor. and turn.	18.50 to 19.00
Low phos. 18 in. under	37.00 to 38.00
No. 1 cupola cast.	39.00 to 40.00
Hvy. breakable cast	33.00 to 34.00
Rails 18 in. and under	44.00 to 45.00
Rails random length	34.00 to 35.00
Drop broken	42.00 to 43.00

BOSTON

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	\$26.00 to \$26.50
No. 2 hvy. melting	27.50 to 28.00
No. 1 bundles	28.50 to 29.00
No. 2 bundles	20.50 to 21.00
Bushellings	22.00 to 22.50
Shoveling turn.	20.50 to 21.00
Machine shop turn.	14.00 to 17.50
Mixed bor. and turn.	13.00 to 16.50
Cl'n cast chem. bor.	28.50 to 29.50
No. 1 machinery cast.	26.00 to 30.00
No. 2 machinery cast.	26.00 to 30.00
Heavy breakable cast.	24.00 to 25.00
Stove plate	23.00 to 24.00

DETROIT

Per gross ton, brokers' buying prices f.o.b. cars:

No. 1 hvy. melting	\$29.00 to \$30.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 bundles	30.00 to 32.00
New busheling	29.00 to 30.00
Flashings	29.00 to 30.00
Mach. shop turn.	18.00 to 19.00
Machinery cast.	35.00 to 37.00
Mixed yard cast.	32.00 to 34.00
Shoveling turn.	19.00 to 20.00
Cast iron borings	18.00 to 19.00
Mixed bor. and turn.	18.00 to 19.00
Low phos. plate	31.00 to 32.00
Heavy breakable cast.	28.00 to 31.00
Stove plate	31.00 to 32.00
Automotive cast.	32.00 to 37.00

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$34.00 to \$35.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 bundles	34.00 to 35.00
No. 2 bundles	26.00 to 26.50
Mach. shop turn.	20.00 to 21.00
Shoveling turn.	25.00 to 26.00
Mixed bor. and turn.	19.00 to 20.00
Clean cast chemical bor.	33.00 to 36.00
No. 1 machinery cast.	38.00 to 39.00
No. 1 mixed yard cast.	35.00 to 36.00
Hvy. breakable cast.	34.00 to 35.00
Hvy. axle forge turn.	34.00 to 35.00
Low phos. acid openhearth	37.00 to 38.00
Low phos. electric furnace	37.00 to 38.00
Low phos. bundles	35.00 to 36.00
RR. steel wheels	39.00 to 40.00
RR. coil springs	39.00 to 40.00
RR. malleable	32.00 to 33.00
Cast iron carwheels	38.00 to 39.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$33.00 to \$34.00
No. 2 hvy. melting	29.00 to 30.00
No. 2 bundled sheets	29.00 to 30.00
Mach. shop turn.	20.00 to 22.00
Shoveling turnings	20.00 to 22.00
Locomotive tires, uncut	38.00 to 39.00
Mis. std. sec. rails	34.00 to 35.00
Steel angle bars	38.00 to 39.00
Rails 3 ft. and under	43.00 to 45.00
RR. steel springs	40.00 to 41.00
Steel car axles	50.00 to 51.00
Brake shoes	30.00 to 31.00
Malleable	34.00 to 35.00
Cast iron car wheels	40.00 to 41.00
No. 1 machinery cast.	40.00 to 41.00
Hvy. breakable cast.	33.00 to 34.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$29.00
No. 2 hvy. melting	29.00
No. 2 bundles	27.00
No. 1 busheling	29.00
Long turnings	22.00
Shoveling turnings	24.00
Cast iron borings	24.00
Rar crops and plate	\$30.00 to 32.00
Structural and plate	30.00 to 32.00
No. 1 cupola cast.	40.00
Stove plate	35.00 to 36.00
No. 1 RR. hvy. melt.	32.50 to 34.00
Steel axles	41.00 to 43.00
Scrap rails	37.00 to 38.00
Rerolling rails	38.00 to 40.00
Angles & splice bars	40.00 to 42.00
Rails 3 ft & under	40.00 to 42.00
Cast iron carwheels	39.00 to 40.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$35.50 to \$36.00
No. 2 hvy. melting	34.50 to 35.00
No. 1 bundles	35.00 to 36.00
No. 2 bundles	32.00 to 33.00
Mach. shop turn.	24.00 to 25.00
Short shov. turn.	25.00 to 26.00
Cast iron borings	25.00 to 26.00
Low phos.	38.50 to 39.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	\$26.00 to \$27.00
No. 2 hvy. melting	23.00 to 24.00
No. 2 bundles	20.00 to 21.00
Mach. shop turn.	14.50 to 15.50
Mixed bor. & turn.	13.00 to 14.00
Shoveling turnings	18.00 to 19.00
Machinery cast.	31.00 to 32.00
Mixed yard cast.	29.00 to 31.00
Heavy breakable cast.	27.00 to 28.00
Charging box cast.	27.00 to 28.00
Unstrp. motor blks.	26.00 to 27.00
Cl'n cast chem. bor.	29.50 to 30.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$34.00 to \$35.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 bundles	29.00 to 30.00
No. 2 bundles	26.00 to 27.00
No. 1 busheling	29.00 to 30.00
Mach. shop turn.	20.00 to 21.00
Shoveling turn.	22.00 to 23.00
Cast iron borings	20.00 to 21.00
Mixed bor. and turn.	20.00 to 21.00
Clean auto. cast.	38.00 to 40.00
Mixed yard cast.	32.00 to 33.00
Stove plate	32.00 to 33.00
RR. malleable	34.00
Small indus. malleable	32.00 to 33.00
Low phos. plate	36.00 to 37.00
Scrap rails	40.00 to 41.00
Rails 3 ft & under	44.00 to 45.00
RR. steel wheels	40.00 to 41.00
RR. coil & leaf spgs.	40.00 to 41.00
RR. knuckles & coup.	40.00 to 41.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$34.50 to \$35.00
No. 2 hvy. melting	33.50 to 34.00
No. 1 bundles	33.50 to 34.00
No. 2 bundles	30.00 to 31.00
No. 1 busheling	30.00 to 31.00
Drop forge flashings	33.50 to 34.00
Mach. shop turn.	23.00 to 23.50
Shoveling turn.	24.00 to 25.00
Steel axle turn.	28.00 to 29.00
Cast iron borings	23.00 to 24.00
Mixed bor. & turn.	22.00 to 23.00
Low phos. 2 ft and under	38.00 to 39.00
No. 1 mach. cast.	42.00 to 43.00
Malleable	38.00 to 39.00
RR. cast.	42.00 to 43.00
Railroad grate bars	37.00 to 38.00
Stove plate	37.00 to 38.00
RR. hvy. melting	39.00 to 39.50
Rails 3 ft and under	46.00 to 48.00
Rails 18 in. and under	47.00 to 49.00

SAN FRANCISCO

Per gross ton, f.o.b. shipping point:

No. 1 hvy. melting	\$25.00
No. 2 hvy. melting	25.00
No. 1 bales	23.00
No. 2 bales	23.00
No. 3 bales	20.00
Mach. shop turn.	15.00
Elec. fur. 1 ft under	\$37.50 to 40.00
No. 1 cupola cast.	38.00 to 42.00
RR. hvy. melting	25.00
Rails	25.00

LOS ANGELES

Per gross ton, f.o.b. shipping point:

No. 1 hvy. melting	\$25.00
No. 2 hvy. melting	25.00
No. 1 bales	23.00
No. 2 bales	23.00
No. 3 bales	20.00
Mach. shop turn.	15.00
Elec. fur. 1 ft. under	\$32.00 to 38.00
No. 1 cupola cast.	38.00 to 42.00
RR. hvy. melting	25.00

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	\$25.00
No. 1 & No. 2 bales	23.00
No. 3 bales	23.00
Elec. fur. 1 ft. and under	36.00
No. 1 cupola cast.	\$30.00 to 40.00
RR. hvy. melting	25.00

HAMILTON, ONT.

Per gross ton delivered to consumer: Cast grades f.o.b. shipping point:

Heavy melting	\$23.00*
No. 1 bundles	23.00*
No. 2 bundles	22.50*
Mechanical bundles	21.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushellings	17.50*
Bushellings, new fact, prop'd	21.00*
Bushellings, new fact, unprop'd	16.00*
Short steel turnings	17.00*
No. 1 cast.	\$48.00 to 50.00*
No. 2 cast.	44.00 to 45.00*

*Ceiling Price.



George Washington, as president in 1793, in approving a requisition for a new chain for a frigate, wrote: "Approved as far as it regards the new chain, but is there an entire loss of the old one?"

Conservation was uppermost in Washington's mind. He wanted to be certain that the old chain, as scrap, would be remelted into needed articles. Then, as now, Scrap played an important role in the nation's economy.

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READING, PA.
Luria Bldg.

LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Comparison of Prices . .

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel:	Mar. 22, 1949	Mar. 15, 1949	Feb. 22, 1949	Mar. 23, 1948
(cents per pound)	1949	1949	1949	1948
Hot-rolled sheets	3.26	3.26	3.26	2.80
Cold-rolled sheets	4.00	4.00	4.00	3.55
Galvanized sheets (10 ga)	4.40	4.40	4.40	3.95
Hot-rolled strip	3.265	3.265	3.265	2.80
Cold-rolled strip	4.063	4.063	4.063	3.55
Plates	3.42	3.42	3.42	2.95
Plates wrought iron	7.85	7.85	7.85	7.25
Stains C-R strip (No. 302)	33.25	33.25	33.25	30.50

Tin and Terneplate:	Mar. 22, 1949	Mar. 15, 1949	Feb. 22, 1949	Mar. 23, 1948
(dollars per base box)				
Tinplate (1.50 lb) cokes	\$7.75	\$7.75	\$7.75	\$6.80
Tinplate, electro (0.50 lb)	6.70	6.70	6.70	6.00
Special coated mfg. ternes	6.65	6.65	6.65	5.90

Bars and Shapes:	Mar. 22, 1949	Mar. 15, 1949	Feb. 22, 1949	Mar. 23, 1948
(cents per pound)				
Merchant bars	3.37	3.37	3.37	2.90
Cold-finished bars	3.995	3.995	3.995	3.55
Alloy bars	3.75	3.75	3.75	3.30
Structural shapes	3.25	3.25	3.25	2.80
Stainless bars (No. 302)	28.50	28.50	28.50	26.00
Wrought iron bars	9.50	9.50	9.50	8.65

Wire:	Mar. 22, 1949	Mar. 15, 1949	Feb. 22, 1949	Mar. 23, 1948
(cents per pound)				
Bright wire	4.15	4.15	4.194	3.55

Rails:	Mar. 22, 1949	Mar. 15, 1949	Feb. 22, 1949	Mar. 23, 1948
(dollars per 100 lb)				
Heavy rails	\$3.20	\$3.20	\$3.20	\$2.75
Light rails	3.55	3.55	3.55	3.10

Semifinished Steel:	Mar. 22, 1949	Mar. 15, 1949	Feb. 22, 1949	Mar. 23, 1948
(dollars per net ton)				
Rerolling billets	\$52.00	\$52.00	\$52.00	\$45.00
Slabs, rerolling	52.00	52.00	52.00	45.00
Forging billets	61.00	61.00	61.00	54.00
Alloy blooms, billets, slabs	63.00	63.00	63.00	66.00

Wire rod and Skelp:	Mar. 22, 1949	Mar. 15, 1949	Feb. 22, 1949	Mar. 23, 1948
(cents per pound)				
Wire rods	3.463	3.619	3.619	2.80
Skelp	3.25	3.25	3.25	2.90

Pig Iron:	Mar. 22, 1949	Mar. 15, 1949	Feb. 22, 1949	Mar. 23, 1948
(per gross ton)	1949	1949	1949	1948
No. 2, foundry, Phila.	\$51.56	\$51.56	\$51.56	\$44.61
No. 2, Valley furnace	46.50	46.50	46.50	39.50
No. 2, Southern Cin'ti*	49.46	49.46	49.46	43.28
No. 2, Birmingham	43.38	43.38	43.38	37.38
No. 2, foundry, Chicago†	46.00	46.00	46.00	39.00
Basic del'd Philadelphia*	50.76	50.76	50.76	44.11
Basic, Valley furnace	46.00	46.00	46.00	39.00
Malleable, Chicago†	46.50	46.50	46.50	39.50
Malleable, Valley	46.50	46.50	46.50	39.50
Charcoal, Chicago	73.78	73.78	73.78	62.46
Ferromanganese‡	161.40	161.40	161.40	145.00

† The switching charge for delivery to foundries in the Chicago district is \$1 per ton.

‡ Average of U. S. prices quoted on Ferroalloy page.

* Does not include interim increase on total freight charges, effective Jan. 11, 1949.

Scrap	Mar. 22, 1949	Mar. 15, 1949	Feb. 22, 1949	Mar. 23, 1948
(per gross ton)				
Heavy melt'g steel, P'gh.	\$36.75	\$36.75	\$38.75	\$40.25
Heavy melt'g steel, Phila.	34.50	35.50	38.50	41.50
Heavy melt'g steel, Ch'go	33.50	34.50	34.50	39.00
No. 1, hy. comp. sh't, Det.	31.00	32.50	33.00	35.50
Low phos. Young'n.	39.00	39.50	45.25	45.25
No. 1, cast, Pittsburgh	41.50	43.50	51.50	62.00
No. 1, cast, Philadelphia	38.50	40.00	44.00	65.50
No. 1, cast, Chicago	41.50	41.50	42.00	69.00

Coke, Connellsville:	Mar. 22, 1949	Mar. 15, 1949	Feb. 22, 1949	Mar. 23, 1948
(per net ton at oven)				
Furnace coke, prompt	\$14.50	\$14.50	\$15.25	\$12.50
Foundry coke, prompt	16.50	16.50	16.75	14.00

Nonferrous Metals:	Mar. 22, 1949	Mar. 15, 1949	Feb. 22, 1949	Mar. 23, 1948
(cents per pound to large buyers)				
Copper, electro, Conn.	23.50	23.50	23.50	21.50
Copper, Lake Conn.	23.625	23.625	23.625	21.625
Tin, Grade A, New York	\$1.03	\$1.03	\$1.03	94.00
Zinc, East St. Louis	17.50	17.50	17.50	12.00
Lead, St. Louis	17.80	17.80	21.30	14.80
Aluminum, virgin	17.00	17.00	17.00	15.00
Nickel, electrolytic	42.93	42.93	42.90	36.56
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	38.50	38.50	38.50	33.00

Composite Prices . .

In accordance with usual practice, THE IRON AGE finished steel composite price has been revised this week, following receipt of fourth quarter 1948 shipment data. The change in the pattern of shipments produces a revised tentative price quotation for this week, last week and a month ago. All shipment data by American Iron & Steel Institute.

FINISHED STEEL (Base Price)	
Mar. 22, 1949	3.75454¢* per lb.
One week ago	3.75454¢* per lb.
One month ago	3.75701¢* per lb.
One year ago	3.27585¢ per lb.

*Revised.

HIGH		LOW	
1949....	3.76049¢ Jan. 1	3.75454¢ Mar. 15	
1948....	3.75700¢ July 27	3.22689¢ Jan. 1	
1947....	3.19541¢ Oct. 7	2.87118¢ Jan. 7	
1946....	2.83599¢ Dec. 31	2.54490¢ Jan. 1	
1945....	2.44104¢ Oct. 2	2.54490¢ Jan. 2	
1944....	2.30837¢ Sept. 5	2.21189¢ Oct. 5	
1943....	2.29176¢	2.29176¢	
1942....	2.28249¢	2.28249¢	
1941....	2.43078¢	2.43078¢	
1940....	2.30467¢ Jan. 2	2.24107¢ Apr. 16	
1939....	2.35367¢ Jan. 3	2.26689¢ May 16	
1938....	2.58414¢ Jan. 4	2.27207¢ Oct. 18	
1937....	2.58414¢ Mar. 9	2.32263¢ Jan. 4	
1936....	2.32263¢ Dec. 28	2.05200¢ Mar. 10	
1935....	2.07642¢ Oct. 1	2.06492¢ Jan. 8	
1934....	2.15367¢ Apr. 24	1.95757¢ Jan. 2	
1933....	1.95578¢ Oct. 3	1.75836¢ May 2	
1932....	1.89196¢ July 5	1.83901¢ Mar. 1	
1931....	1.99626¢ Jan. 13	1.86586¢ Dec. 29	
1929....	2.31773¢ May 28	2.26498¢ Oct. 29	

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

PIG IRON		SCRAP STEEL	
....	\$46.74 per gross ton....	....	\$34.92 per gross ton....
....	\$46.74 per gross ton....	....	\$35.58 per gross ton....
....	\$46.74 per gross ton....	....	\$37.25 per gross ton....
....	\$40.29 per gross ton....	....	\$40.25 per gross ton....

HIGH		LOW		HIGH		LOW	
\$46.82 Jan. 4	\$46.74 Jan. 25	\$43.00 Jan. 1	\$34.92 Mar. 22				
46.91 Oct. 12	39.58 Jan. 6	43.16 July 27	39.75 Mar. 9				
37.98 Dec. 30	30.14 Jan. 7	42.58 Oct. 28	29.50 May 20				
30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1				
25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22				
\$23.61	\$23.61	19.17 Jan. 11	15.76 Oct. 24				
23.61	23.61	\$19.17	\$19.17				
23.61	23.61	19.17	19.17				
\$23.61 Mar. 20	\$23.45 Jan. 2	\$22.00 Jan. 7	\$19.17 Apr. 10				
23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9				
22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16				
23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7				
23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9				
19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8				
18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29				
17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25				
16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3				
14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5				
15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29				
18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8				

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

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Iron and Steel Prices . . .

Steel prices shown here are f.o.b. producing points in cents per pound unless otherwise indicated. Extras apply. (1) Commercial quality sheet grade; prices, 0.25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Cokes, 1.25 lb, deduct 25¢ per base box. (6) 18 gage and heavier. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb and over. (9) Carload lot in manufacturing trade. (10) Hollowware enameling, gages 29 to 31 only. (11) Produced to dimensional tolerances in AISI Manual Sec. 6. (12) Slab prices subject to negotiation in most cases. (13) San Francisco only. (14) Los Angeles only. (15) San Francisco and Los Angeles only. (16) Seattle only. (17) Seattle and Los Angeles only.

PRODUCTS	Base prices at producing points apply to the sizes and grades produced in these areas														
	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio		Detroit	Johns- town	Seattle, S. Frisco, Los Angeles	Fontana
INGOTS Carbon forg ¹⁻⁹	\$50.00														
Alloy	\$61.00						(per net ton)								
BILLETS, BLOOMS, SLABS Carbon, rerolling ^{1,2}	\$52.00				\$52.00	\$52.00	(per net ton)						\$52.00		
Carbon forging billets	\$61.00	\$61.00	\$61.00	\$61.00	\$61.00	\$61.00	(per net ton)						\$61.00		
Alloy	\$63.00	\$63.00				\$63.00	(Bethlehem, Canton, Massillon = \$63.00) (per net ton)								
PIPE SKELP	3.25						3.25				Warren = 3.25				
WIRE RODS	3.40	3.40		3.40	3.40		3.65	3.50			Worcester 3.70		3.40	4.05 ^{1,3} 4.10 ^{1,4}	
SHEETS Hot-rolled ⁶	3.25 to 3.30	3.25	3.25	3.25- 3.30	3.25	3.25	3.25	3.25			Warren, Ashland = 3.25	3.45		3.95 ^{1,5}	5.65
Cold-rolled ¹	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.20	4.00	Warren 4.00	4.20		Pittsburg, Cal. 4.95	
Galvanized (10 gage)	4.40	4.40	4.40		4.40			4.40	Canton = 4.40	4.40	Ashland = 4.40			5.15 ^{1,5}	
Enameling (12 gage)	4.40	4.40	4.40	4.40			4.40		4.60	4.40		4.70			
Long ternes ² (10 gage)	4.80		4.80							4.80					
STRIP Hot-rolled ³	3.25 to 3.30	3.25 to 3.30	3.25	3.25 to 3.30	3.25	3.25	3.25	3.25		3.25	Warren = 3.25	3.45		4.00 to 4.25	5.90
Cold-rolled ⁴	4.00	4.25		4.00		4.00	4.00	4.00			New Haven 4.50 Warren = 4.00 to 4.25	4.20 to 4.50			7.10
TINPLATE Cokes, 1.50 lb. ⁵ base box	\$7.75	\$7.75	\$7.75		\$7.85			\$7.85	\$7.95		Warren, Ohio = \$7.75			Pittsburg, Cal. = \$8.50	
Electrolytic 0.25, 0.50, 0.75 lb. box	Deduct \$1.30, \$1.05 and 75¢ respectively from 1.50 lb. coke base box price														
TERNES MFG., special coated	Deduct \$1.10 from 1.50 lb. coke base box price														
BLACKPLATE CANMAKING 55 to 128 lb.	Deduct \$2.00 from 1.50 lb. coke base box price														
BLACKPLATE, h.e., 29 ga. ¹⁰	5.30	5.30	5.30					5.40			Warren, Ohio = 5.30				
BARS Carbon Steel	3.35 to 3.65	3.35	3.35	3.35	3.35	3.35	3.35	3.35		3.35	Canton = 3.35	3.55	3.35	4.05 to 4.10	5.30
Reinforcing (billet) ⁷	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35			Canton = 3.35		3.35	4.05 to 4.10	5.30
Cold-finished ⁸	3.95 to 4.00	4.00	4.00	4.00		4.00	4.00					4.30			
Alloy, hot-rolled	3.75	3.75	3.75			3.75	3.75		Bethlehem, Canton, Massillon = 3.75			4.05	3.75	4.80 ^{1,4}	4.75
Alloy cold-drawn	4.65 to 4.75	4.65	4.65	4.65		4.65	4.65		Massillon = 4.65		Worcester 4.95				
PLATE Carbon steel ¹¹	3.40 to 3.60	3.40	3.40	3.40 to 3.60	3.40 Cons	3.45 hohocken	3.40 = 3.95	3.45 Coatesville = 3.75, Claymont = 3.95 Geneva = 3.40, Harrisburg = 6.50				3.65	3.45	4.30 ^{1,6}	5.80
Floor plates	4.65	4.65		4.65					Cons hohocken = 4.65						
Alloy	4.40	4.40							Coatesville = 5.10						
SHAPES, Structural	3.25 to 3.30	3.25	3.25		3.25	3.30		Bethlehem = 3.30, Geneva, Utah = 3.25					3.30	3.85 to 4.30	5.75
MANUFACTURERS' WIRE ⁹ Bright	4.15	4.15		4.15	4.15		4.15	4.25	Duluth = 4.15, Worcester = 4.45				4.15	5.15 ^{1,3}	
Spring (high carbon)	5.20	5.20		5.20				5.30	Worcester = 5.50 New Haven, Trenton = 5.50				5.20	Duluth = 5.20-6.15	
PILING, Steel sheet	4.05	4.05				4.05									

STAINLESS STEELS

Base prices, in cents per pound, f.o.b. producing point

Product	Chromium Nickel						Straight Chromium		
	301	302	303	304	316	347	410	418	430
Ingot, re-rolling.....	12.75	13.50	15.00	15.50	22.75	20.00	11.25	13.75	11.50
Slabs, billets, re-rolling.....	17.00	18.25	20.25	19.25	30.25	26.75	15.00	18.50	15.25
Forging discs, die blocks, rings.....	30.50	30.50	33.00	32.00	49.00	41.00	24.50	25.00	25.00
Billets, forging.....	24.25-28.50	24.25-28.50	26.25-28.75	25.50-27.75	39.00-42.75	32.75-35.75	19.50-21.50	20.00-21.75	20.00-21.75
Bars, wire, structurals.....	28.50	28.50	31.00	30.00	46.00	38.50	23.00	23.50	23.50
Plates.....	32.00	32.00	34.00	34.00	50.50	44.00	28.00	28.50	26.50
Sheets.....	37.50-40.75	37.50-40.75	39.50-43.00	39.50-43.00	53.00-57.25	50.00-54.00	33.00	33.50	35.50
Strip, hot-rolled.....	24.25	25.75	30.00	27.75	46.00	38.75	21.25	28.00	21.75
Strip, cold-rolled.....	30.50-30.75	33.00-33.50	38.50-39.50	35.00-35.75	55.00-57.25	48.50-50.00	27.00	33.50	27.50

ELECTRODES

Cents per lb. f.o.b. plant, threaded electrodes with nipples, unboxed

Diameter in in.	Length in in.	
Graphite		
17, 18, 20	60, 72	16.00¢
8 to 16	48, 60, 72	16.50¢
7	48, 60	17.75¢
6	48, 60	19.00¢
4, 5	40	19.50¢
3	40	20.50¢
2½	24, 30	21.00¢
2	24, 30	23.00¢
Carbon		
40	100, 110	7.50¢
35	65, 110	7.50¢
30	65, 84, 110	7.50¢
24	72 to 104	7.50¢
17 to 20	84, 90	7.50¢
14	60, 72	8.00¢
10, 12	60	8.25¢
8	60	8.50¢

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	90.5¢
18	4	1	—	5	\$1.42
18	4	2	—	—	\$1.025
1.5	4	1.5	8	—	65¢
6	4	2	6	—	69.5¢

High-carbon-chromium 52¢
 Oil hardened manganese 29¢
 Special carbon 26.5¢
 Extra carbon 22¢
 Regular carbon 19¢
 Warehouse prices on and east of Mississippi are 2½¢ per lb higher. West of Mississippi 4½¢ higher.

ELECTRICAL SHEETS

24 gage, HR cut lengths, f.o.b. mill

	Cents per lb
Armature	5.45 to 6.05
Electrical	5.95 to 6.55
Motor	6.70 to 6.95
Dynamo	7.50 to 7.75
Transformer 72	8.05 to 10.05
Transformer 65	8.60 to 10.60
Transformer 58	9.30 to 11.30
Transformer 52	10.10 to 11.35

RAILS, TRACK SUPPLIES

F.o.b. mill

Standard rails, 100 lb and heavier, No. 1 quality, per 100 lb..... \$3.20†
 Joint bars, 100 lb 4.25
 Light rails (from billets) per 100 lb 3.55

Base Price cents per lb

Track spikes 5.35
 Axles 5.20
 Screw spikes 8.00
 Tie plates 4.05
 Tie plates, Pittsburgh, Calif.* 4.20
 Track bolts, untreated 8.25
 Track bolts, heat treated, to rail-roads 8.50

*Seattle, add 30¢.
 †CF&I and Inland, \$3.50.

C-R SPRING STEEL

Base per pound f.o.b. mill

0.26 to 0.40 carbon	4.00¢
0.41 to 0.60 carbon	5.50¢
0.61 to 0.80 carbon	6.10¢
0.81 to 1.05 carbon	8.05¢
1.06 to 1.35 carbon	10.35¢
Worcester, add 0.30¢.	

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless clad		
No. 304, 20 pct, f.o.b.		
Coatesville, Pa.	*26.50	
Washington, Pa.	*26.50	*22.50
Claymont, Del.	*26.50	
Conshohocken, Pa.		*22.50
Nickel-clad		
10 pct f.o.b. Coatesville, Pa.	27.50	
Inconel-clad		
10 pct, f.o.b. Coatesville.	36.00	
Monel-clad		
10 pct, f.o.b. Coatesville.	29.00	
Aluminized steel sheets		
Hot dip, 20 gage, f.o.b. Butler, Pa.		9.25

*Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. mill

	Base Column	Pittsburg, Calif.
Standard & coated nails* 103	123	
Galvanized nails* 103	123	
Woven wire fence† 109	132	
Fence posts, carloads††. 114	...	
Single loop bale ties..... 106	130	
Galvanized barbed wire** 123	143	
Twisted barless wire... 123	...	

* Pgh., Chi., Duluth; Worcester, 6 columns higher. † 15½ gage and heavier. ** On 80 rod spools, in carloads. †† Duluth only.

Base per 100 lb Pittsburg, Calif.

Annealed fence wire†... \$4.80	\$5.75
Annealed, galv. fencing† 5.25	6.20
Cut nails, carloads†† ... 6.75	...

† Add 30¢ at Worcester; 10¢ at Sparrows Pt.
 †† Less 20¢ to jobbers.

HIGH STRENGTH, LOW ALLOY STEELS

Mill base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	Hi Steel	Mayaril R	Ottecoloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates.....	5.20	5.20	5.20	5.30	5.20	5.30	5.20	5.40	5.65
Sheets									
Hot-rolled....	4.95	4.95	4.95	5.25	4.95	4.95	4.95	5.15	5.25
Cold-rolled....	6.05	6.05	6.05	.....	6.05	6.05	6.05	6.25	6.35
Galvanized....	.....	6.75	.....	.....	.....	6.75	.....	.....	.....
Strip									
Hot-rolled....	4.95	4.95	4.95	.....	4.95	4.95	4.95	5.15	5.25
Cold-rolled....	.....	.....	6.05	.....	.....	6.05	6.05	.....	6.35
Shapes.....	.....	4.95	.....	.....	4.95	5.05	4.95	.....	.....
Beams.....	.....	4.95	.....	.....	.....	.....	.....	.....	.....
Bars									
Hot-rolled....	5.10	5.10	5.10	.....	5.10	5.10	5.10	.....	5.40
Bar shapes.....	.....	5.10	.....	.....	5.10	5.10	5.10	.....	.....

PRICES

PIPE AND TUBING

Base discounts, f.o.b. mills,
Base price, \$200.00 per net ton.

STANDARD, THREADED AND COUPLED

Steel, butt weld	Black	Galv.
1/2-in.	43 to 41	20 to 18
3/4-in.	46 to 44	24 to 22
1-in.	48 1/2 to 46 1/2	27 to 25
1 1/4-in.	49 to 47	27 1/2 to 25 1/2
1 1/2-in.	49 1/2 to 47 1/2	28 to 26
2-in.	50 to 48	28 1/2 to 26 1/2
2 1/2 to 3-in.	50 1/2 to 49 1/2	29 to 27

Steel, lap weld		
2-in.	39 1/2	17 1/2
2 1/2 to 3-in.	42	21 1/2
3 1/2 to 6-in.	46 1/2 to 42	20 1/2 to 24 1/2

Steel, seamless		
2-in.	38 1/2 to 27	16 1/2 to 5
2 1/2 to 3-in.	41 1/2 to 35	19 1/2 to 10 1/2
3 1/2 to 6-in.	43 1/2 to 38 1/2	21 1/2 to 16 1/2

Wrought Iron, butt weld		
1/2-in.	+20 1/2	+52 1/2
3/4-in.	+10 1/2	+41 1/2
1 & 1 1/4-in.	+4 1/2	+32 1/2
2-in.	+1 1/2	+29
3-in.	+2	+28 1/2

Wrought Iron, lap weld		
2-in.	+7 1/2	+36 1/2
2 1/2 to 3 1/2-in.	+5	+32
4-in.	list	+26
4 1/2 to 8-in.	+2	+27 1/2

EXTRA STRONG, PLAIN ENDS

Steel, butt weld		
1/2-in.	42 to 40	20 1/2 to 18 1/2
3/4-in.	46 to 44	24 1/2 to 22 1/2
1-in.	48 to 46	27 1/2 to 25 1/2
1 1/4-in.	48 1/2 to 46 1/2	28 to 26
1 1/2-in.	49 to 47	28 1/2 to 26 1/2
2-in.	49 1/2 to 47 1/2	29 to 27
2 1/2 to 3-in.	50 to 48	29 1/2 to 27 1/2

Steel, lap weld		
2-in.	39 1/2	18 1/2
2 1/2 to 3-in.	44 1/2	23 1/2
3 1/2 to 6-in.	48 to 44	23 to 27

Steel, seamless		
2-in.	37 1/2 to 32 1/2	16 1/2 to 11 1/2
2 1/2 to 3-in.	41 1/2 to 36 1/2	20 1/2 to 15 1/2
3 1/2 to 6-in.	45	24

Wrought Iron, butt weld		
1/2-in.	+16	+46 1/2
3/4-in.	+9 1/2	+39 1/2
1 to 2-in.	+1 1/2	+28 1/2

Wrought Iron, lap weld		
2-in.	+4 1/2	+33
2 1/2 to 4-in.	+5	+21 1/2
4 1/2 to 6-in.	+1	+26

For threads only, butt weld, lap weld and seamless pipe, one point higher discount (lower price) applies. For plain ends, butt weld, lap weld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lap weld and seamless 3 1/2-in. and larger four points higher discount (lower price) applies. On butt weld and lap weld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Prices per 100 ft at mill in carload lots, out length 4 to 24 ft inclusive.

OD Gage	Seamless	Electric Weld
in. BWG	H.R.	C.R.
2	18	19.18
2 1/2	12	25.79
3	12	28.68
3 1/2	11	35.85
4	10	44.51

CAST IRON WATER PIPE

	Per net ton
6 to 24-in., del'd Chicago	\$106.70
6 to 24-in., del'd N. Y.	103.50 to 108.40
6 to 24-in., Birmingham	93.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less	120.30
Class "A" and gas pipe, \$5 extra; 4-in. pipe is \$5 a ton above 6-in.	

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. mill Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

	Pct Off	List
1/2 in. & smaller x 6 in. & shorter	35	
9/16 & 5/8 in. x 6 in. & shorter	37	
3/4 in. & larger x 6 in. & shorter	34	
All diam, longer than 6 in.	30	
Lag, all diam over 6 in. longer	35	
Lag, all diam x 6 in. & shorter	37	
Plow bolts	47	

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)	
1/2 in. and smaller	35
9/16 to 1 in. inclusive	34
1 1/4 to 1 1/2 in. inclusive	32
1 1/2 in. and larger	27
On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.	

Semifinished Hexagon Nuts

	USS	SAE
7/16 in. and smaller	41	
1/2 in. and smaller	38	
1/2 in. through 1 in.	39	
9/16 in. through 1 in.	37	
1 1/4 in. through 1 1/2 in.	35	37
1 1/2 in. and larger	28	
In full case lots, 15 pct additional discount.		

Stove Bolts

Packages, nuts separate	\$61.75
In bulk	70.00

Large Rivets

	(1/2 in. and larger)
	Base per 100 lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	\$6.75
F.o.b. Lebanon, Pa.	6.75

Small Rivets

	(7/16 in. and smaller)
	Pct off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	48

Cap and Set Screws

	Pct Off	List
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	46	
1/4 to 1 in. x 6 in., SAE (1035), heat treated	35	
Milled studs	19	
Flat head cap screws, listed sizes	5	
Fillister head cap, listed sizes	28	

FLUORSPAR

Washed gravel fluorspar, f.o.b. cars, Rosiclare, Ill.

	Base price per
Effective CaF ₂ Content:	net ton
70% or more	\$27.00
60% or less	34.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	\$7.60
Old range, nonbessemer	7.45
Mesa, bessemer	7.35
Mesa, nonbessemer	7.20
High phosphorus	7.20
After Dec. 31, 1948, increases or decreases in Upper Lake freight, dock and handling charges and taxes thereon to be for the buyers' account.	

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.l.f.	7.9¢ to 9.0¢
New York, ocean bags...	
Domestic sponge iron, 98+ % Fe, carload lots	9.0¢ to 15.0¢
Electrolytic iron, annealed, 99.5+ % Fe	31.5¢ to 39.5¢
Electrolytic iron, unannealed, minus 325 mesh, 99+ % Fe	48.5¢
Hydrogen reduced iron, minus 300 mesh, 98+ % Fe	63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 microns, 98%, 99.8% + Fe	90.0¢ to \$1.75
Aluminum	31.00¢
Antimony	51.17¢
Brass, 10 ton lots	27.25 to 37.25¢
Copper, electrolytic	33.625¢
Copper, reduced	34.25¢
Cadmium	\$2.40
Chromium, electrolytic, 99% min.	\$3.50
Lead	26.00¢
Manganese	60.00¢
Molybdenum, 99%	\$2.65
Nickel, unannealed	67.00¢
Nickel, spherical, minus 30 mesh, unannealed	68.00¢
Silicon	34.00¢
Solder powder	8.5¢ plus metal cost
Stainless steel, 302	75.0¢
Tin	\$1.15¢
Tungsten, 99%	\$2.90
Zinc, 10 ton lots	17.75 to 22.25¢

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	\$14.00 to \$15.00
Connellsville, Pa.	
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	\$16.00 to \$17.00
Foundry, Byproduct	
Buffalo, del'd	\$22.95
Chicago, f.o.b.	20.40
Detroit, f.o.b.	19.40
New England, del'd	23.35
Seaboard, N. J., f.o.b.	21.50
Philadelphia, f.o.b.	21.05
Swedeland, Pa., f.o.b.	21.00
Painesville, Ohio, f.o.b.	20.90
Erie, del'd	\$21.50 to 23.50
Cleveland, del'd	22.45
Cincinnati, del'd	21.50
St. Paul, f.o.b.	23.50
St. Louis, del'd	20.98
Birmingham, del'd	18.66

REFRACTORIES

(F.o.b. Works)

	Carloads, Per 1000
Fire Clay Brick	
First quality, Pa., Md., Ky., Mo., Ill. (except Salina, Pa., add \$5)	\$30.00
No. 1 Ohio	74.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	74.00
No. 2 Ohio	66.00
Ground fire clay, net ton bulk (except Salina, Pa., add \$1.50)	11.50
Silica Brick	
Mt. Union, Pa., Ensley, Ala.	\$80.00
Childs, Pa.	84.00
Hays, Pa.	85.00
Chicago District	89.00
Western, Utah and Calif.	95.00
Super Duty, Hays, Pa., Athens, Tex.	85.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	\$13.75 to 14.00
Silica cement, net ton, bulk, Hays, Pa.	16.00
Silica cement, net ton, bulk, Ensley, Ala.	15.00
Silica cement, net ton, bulk, Chicago District	14.75
Silica cement, net ton, bulk, Utah and Calif.	21.00

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt. Chester	\$69.00
Magnesite Brick	
Standard, Balt. and Chester	\$91.00
Chemically bonded, Balt. and Chester	80.00

Grain Magnesite

	Std. 3/4-in. grains
Domestic, f.o.b. Balt. and Chester, in bulk, fines removed	\$56.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines	\$30.50 to \$1.00
in sacks with fines	35.00 to 35.50

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk, Midwest, add 10¢; Missouri Valley, add 20¢	\$12.25
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PRICES

WAREHOUSE PRICES

Base prices, f.o.b. warehouse, dollars per 100 lb.
(Metropolitan area delivery, add 15¢ to base price except Cincinnati and
New Orleans (*), add 10¢; New York, add 20¢.)

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Baltimore	5.31	6.21- 6.41	6.95- 7.11	5.37	....	5.58	5.38	5.42	6.18	....	10.10	....	....
Birmingham	5.05	....	6.45	5.05	6.68	5.25	5.00	5.00	6.88	....	....	....	....
Boston	5.55	6.45- 6.75	7.71- 7.85	5.65- 5.95	6.75	5.80	5.42	5.52	6.27	9.64- 9.82	10.04- 10.07	11.23- 11.52	11.47- 11.52
Buffalo	4.85	5.00- 5.75	7.26- 7.70	5.29- 5.65	6.35- 7.27	5.35	5.10	5.05- 5.15	5.80	9.70- 9.73	9.95- 9.98	11.15- 11.18	11.40- 11.43
Chicago	4.85	5.75	7.10	4.85	6.68	5.10	.90	4.90	5.70	9.35- 9.50	9.60- 9.75	10.80- 10.90	11.05- 11.15
Cincinnati	5.16- 5.28*	6.13*- 6.18	7.53	5.28*- 5.55	....	5.53*- 5.63	5.40*- 5.48	5.33*- 5.55	6.09*- 6.10	9.74	9.99	11.19	11.44
Cleveland	4.98- 5.16	5.75- 6.06	7.20- 7.46	5.03- 6.15	....	5.37- 5.54	5.16- 5.47	5.17- 5.34	5.90- 5.97	9.49- 9.66	9.74- 9.91	10.95- 11.07	11.19- 11.32
Detroit	5.28- 5.32	6.07- 6.18	7.53- 7.58	5.28- 5.47	6.27- 6.58	5.53- 5.57	5.40	5.33- 5.55	6.01- 6.10	9.69- 9.82	9.94- 10.07	11.11- 11.14	11.35- 11.39
Houston	6.50- 6.70	....	8.50	7.00	....	6.70	6.55	6.65	7.60	10.30	10.25	11.45	11.70
Indianapolis	5.15	6.06	7.39	5.15	6.25	5.40	5.20	5.35	6.50	....	....	....	....
Los Angeles	6.45- 6.60	7.90- 8.05	8.75- 8.90	6.65- 6.80	9.35 ⁵	6.15- 7.60	5.95- 6.10	6.10- 6.25	7.95 ¹⁴ - 9.35	10.90- 11.60	10.85- 11.55	12.40- 12.95	12.65- 13.20
Memphis	5.75	6.60	....	5.95	6.80	5.95	5.75	5.75	6.50	....	....	....	....
Milwaukee	5.03	5.93	7.28	5.38	6.86	5.28	5.08	5.08	5.87- 5.88	9.53	9.78	10.98	11.23
New Orleans	5.95*	6.75*	....	6.15*	....	6.15*	5.95*	5.95*	6.65*	....	....	....	....
New York	5.40- 5.51	6.46	7.71- 7.66	5.62- 5.98	....	5.70- 6.00	5.33- 5.61	5.57- 5.80	6.41- 6.61	9.73- 9.93	10.18	11.18- 11.38	11.43- 11.63
Norfolk	5.80	....	....	6.05	....	6.05	6.05	6.05	7.05	....	....	....	....
Omaha	5.92	....	9.18	5.92	....	6.17	5.97	5.97	6.77	....	....	....	....
Philadelphia	5.15- 5.44	6.36- 6.79	7.33- 7.43	5.35- 5.45	6.74	5.38	5.10	5.40- 5.45	6.19	9.50	9.75- 10.34	10.95	11.20
Pittsburgh	4.85	5.75 ¹	7.16	5.00	6.00	5.05	4.90	4.90	5.65	9.35	9.60	10.80	11.05- 11.30
Portland	6.50*- 6.60	8.00 ¹	8.80- 9.20	6.85 ⁸	....	6.30 ⁸	6.35 ⁸	6.35 ⁸	8.25 ¹⁴	10.50 ⁶	10.10 ⁶	....	....
Salt Lake City	7.05- 8.00	8.20	7.90- 9.06	7.10- 7.70	....	5.75- 6.85	6.65- 7.00	6.95- 7.25	7.40	....	....	....	....
San Francisco	5.95 ⁸	7.15- 7.85	8.25- 8.70	6.75 ⁸	....	7.60 ⁸	5.90 ⁸	5.90 ⁸	7.55	10.90	10.85	10.40	12.65
Seattle	6.20 ⁴ - 7.10 ⁴	7.75 ² - 8.65 ²	7.65- 9.15 ²	6.55 ⁴ - 6.70 ⁴	....	6.20- 6.35 ⁴	6.15- 6.30 ⁴	6.05 ⁴ - 6.20 ⁴	8.00 ¹⁴ - 8.15 ¹⁴	....	10.30 ¹⁵ - 11.35 ¹⁵	....	12.00 ¹⁵ - 14.10 ¹⁵
St. Louis	5.21- 5.37	6.12- 6.27	7.47- 7.52	5.22- 5.97	8.68	5.47- 5.62	5.27- 5.42	5.27- 5.92	6.07- 6.22	9.72	9.97	....	11.42
St. Paul	5.44	6.19- 6.34	7.74	5.44	6.82	5.64- 6.69	5.49	5.49	6.29	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

COLD-ROLLED:

Sheets, 400 to 1999 lb; strip, extras on all quantities bars 1000 lb and over.

ALLOY BARS:

1000 to 1999 lb.

GALVANIZED SHEETS:

450 to 1499 lb.

EXCEPTIONS:

(1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb; (18) 1000 to 1499 lb.

HOT-ROLLED:

Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight nor the 6 pct increase on total freight charges in the Eastern Zone (5 pct Southern Zone, 4 pct Western Zone), effective Jan. 11, 1949.

PRODUCING POINT PRICES

Producing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	48.00	....	....	....	....
Birmingham	42.88	43.38	....	....	....
Buffalo	47.00	47.00	47.50	....	....
Chicago	46.00	46.50	46.50	47.00	....
Cleveland	46.00	46.50	46.50	47.00	51.00
Duluth	46.00	46.50	46.50	47.00	....
Erie	46.00	46.50	46.50	47.00	....
Everett	....	52.75	53.25	....	....
Granite City	47.90	48.40	48.90	....	....
Ironton, Utah	46.00- 55.00	46.50- 55.50	....	....	....
Lone Star, Texas	50.00	50.50	....	....	....
Neville Island	46.00	46.50	46.50	....	....
Geneva, Utah	46.00	46.50	....	....	....
Sharpsville	46.00	46.50	46.50	47.00	....
Steeltown	46.00	46.50	49.00	49.50	54.00
Struthers, Ohio	46.00	....	....	....	....
Swedeland	50.00	50.50	51.00	51.50	....
Toledo	46.00	46.50	46.50	47.00	....
Troy, N. Y.	....	....	....	....	54.00
Youngstown	46.00	46.50	46.50	....	....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Producing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	\$0.50 Arb.	....	52.75	53.25	....	....
Boston	Steeltown	6.27	54.27	54.77	55.27	56.77	60.27
Brooklyn	Bethlehem	3.90	51.90	....	....	....	....
Cincinnati	Birmingham	6.09	48.97	49.46	....	....	....
Jersey City	Bethlehem	2.39	50.39	....	....	....	....
Los Angeles	Geneva-Ironton	6.93	52.93- 61.93	53.43- 43	....	....	....
Mansfield	Cleveland-Toledo	3.03	49.03- 48.53	49.03- 49.03	49.53	50.03	54.63
Philadelphia	Bethlehem	2.21	50.21	....	....	....	....
Philadelphia	Swedeland	1.31	51.31	51.81	52.31	52.81	....
Philadelphia	Steeltown	2.81	50.81	51.31	51.81	52.31	56.81
San Francisco	Geneva-Ironton	6.93	52.93- 61.93	53.43- 43	....	....	....
Seattle	Geneva-Ironton	6.93	52.93- 61.93	53.43- 43	....	....	....
St. Louis	Granite City	0.75 Arb.	48.68	49.15	49.65	....	....

† Low Phos, Southern Grade

Producing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct for foundry iron); phosphorus differential, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess

of 1.00 pct. \$2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and \$1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct. C/L per g.t. f.o.b. Jackson, Ohio —\$69.50; f.o.b. Buffalo, \$60.75. Add \$125 per ton for each additional 0.50 pct Si up to 12 pct. Add 50¢ per ton for each 0.50 pct

Mn over 1.00 pct. Add \$1.00 per ton for 0.75 pct or more P. Bessemer ferro-silicon prices are \$1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus \$66.00 per gross ton, f.o.b. Lyles, Tenn. Delivered Chicago, \$78.75. High phosphorus charcoal pig iron is not being produced.

FERROALLOY PRICES

Ferromanganese

78-82% Mn, Maximum contract base price, gross ton, lump size.	
F.o.b. Birmingham	\$174
F.o.b. Niagara Falls, Alloy, W. Va., Westland, Ont.	\$172
F.o.b. Johnstown, Pa.	\$174
F.o.b. Sheridan, Pa.	\$172
F.o.b. Etna, Pa.	\$175
\$2.00 for each 1% above 82% Mn; penalty, \$2.00 for each 1% below 78%.	
Briquets—Cents per pound of briquet, delivered, 66% contained Mn.	
Carload, bulk	10.45
Ton lots	12.05
Less ton lots	12.95

Spiegeleisen

Contract prices gross ton, lump, f.o.b.	
16-19% Mn	19-21% Mn
3% max. Si	3% max. Si
Palmerton, Pa.	\$64.00
Pgh. or Chicago	\$65.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.	
96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.	
Carload, packed	35.5
Ton lots	37.0

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.	
Carloads	28
Ton lots	30
Less ton lots	32

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, delivered.			
	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	25.25	27.10	28.30
0.10% max. C	24.75	26.60	27.80
0.15% max. C	24.25	26.10	27.30
0.30% max. C	23.75	25.60	26.80
0.50% max. C	23.25	25.10	26.30
0.75% max. C			
7.00% max. C	20.25	22.10	23.30

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C. For 2% max. C, deduct 0.2¢.	
Carload bulk	8.95
Ton lots	10.60
Briquet, contract basis, carlots, bulk delivered, per lb of briquet	10.30
Ton lots	11.90
Less ton lots	12.80

Silvery Iron (electric furnace)

SI 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, openhearth \$84.00, foundry, \$85.00; \$84.75 f.o.b. Niagara Falls; Electric furnace silvery iron is not being produced at Jackson. Add \$1.00 per ton for each additional 0.50% Si up to and including 18%. Add \$1.00 for each 0.50 pct. Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.	
96% Si, 2% Fe	20.70
97% Si, 1% Fe	21.10

Silicon Briquets

Contract price, cents per pound of briquet, bulk, delivered, 40% Si, 1 lb Si briquets.	
Carload, bulk	6.30
Ton lots	7.90
Less ton lots	8.80

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size, bulk, in carloads, delivered.	
25% Si	18.50
50% Si	11.30
75% Si	13.50
85% Si	14.65
90-95% Si	16.50

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.			
	Cast	Turnings	Distilled
Ton lots	\$2.05	\$2.95	\$3.75
Less ton lots..	2.40	3.30	4.55

Ferrochrome

Contract prices, cents per pound, contained Cr, lump size, bulk, in carloads, delivered.	
(65-72% Cr, 2% max. Si)	
0.06% C	28.75
0.10% C	28.25
0.15% C	28.00
0.20% C	27.75
0.50% C	27.50
1.00% C	27.25
2.00% C	27.00
65-69% Cr, 4-9% C	20.50
62-66% Cr, 4-6% C, 6-9% Si	21.35
Briquets—Contract price, cents per pound of briquet, delivered, 60% chromium.	
Carload, bulk	13.75
Ton lots	15.25
Less ton lots	16.15

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, delivered.	
High carbon type: 60.65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.	
Carloads	21.60
Ton lots	23.75
Less ton lots	25.25
Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.	
Carloads	27.75
Ton lots	30.05
Less ton lots	31.85

Chromium Metal

Contract prices, cents per lb chromium contained packed, delivered, ton lots. 97% min. Cr, 1% max. Fe.	
0.20% max. C	1.09
0.50% max. C	1.05
9.00% min. C	1.04

Calcium—Silicon

Contract price per lb of alloy, lump, delivered.	
30-33% Ca, 60.65% Si, 3.00% max. Fe.	
Carloads	17.90
Ton lots	21.00
Less ton lots	22.50

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered.	
16-20% Ca, 14-18% Mn, 53-59% Si.	
Carloads	19.25
Ton lots	21.55
Less ton lots	22.55

CMSZ

Contract price, cents per pound of alloy, delivered.	
Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.	
Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.	
Ton lots	19.75
Less ton lots	21.00

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.	
Ton lots	15.75¢
Less ton lots	17.00¢

Graphidox No. 4

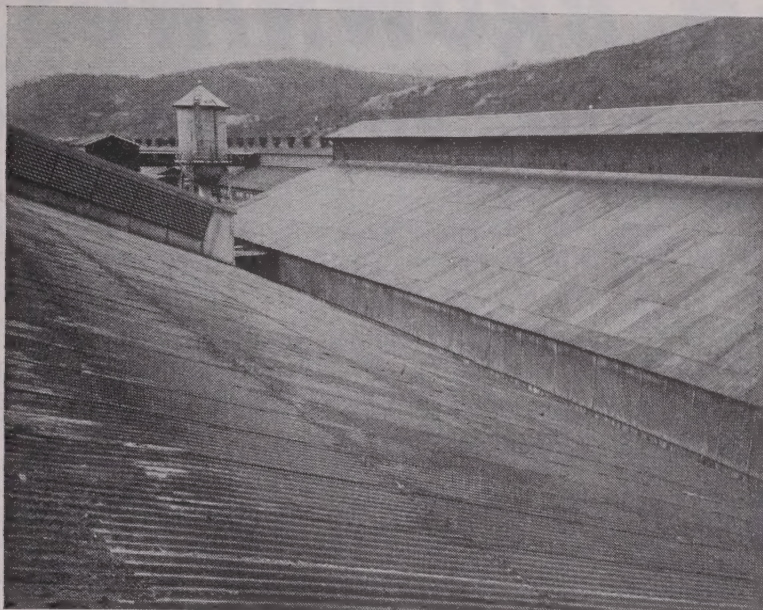
Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. SI 48 to 52%, TI 9 to 11%, Ca 5 to 7%.	
Ton lots and carload packed	18.00¢
Less ton lots	19.50¢

SMZ

Contract price, cents per pound of alloy, delivered. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.	
Ton lots	17.25
Less ton lots	18.50

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, per pound contained W, 5 ton lots, delivered	\$2.25
Ferrovandium, 35-55%, contract basis, delivered, per pound, contained, V.	
Openhearth	\$2.90
Crucible	3.00
High speed steel (Frimos)	3.10
Vanadium pentoxide, 88-92% V ₂ O ₅ contract basis, per pound contained V ₂ O ₅	\$1.20
Ferrocolumbium, 50-60% contract basis, delivered, per pound contained Cb.	
Ton lots	\$2.90
Less ton lots	2.95
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo.	\$1.10
Calcium molybdate, 45-50%, f.o.b. Langeloth, Pa., per pound contained Mo.	96¢
Molybdenum oxide briquets, f.o.b. Langeloth, Pa., per pound contained Mo.	95¢
Ferrotitanium, 40%, regular grade, 10% C max., f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti	\$1.28
Ferrotitanium, 25%, low carbon, f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti	\$1.40
Less ton lots	1.45
Ferrotitanium, 15 to 19%, high carbon, f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, carloads, per net ton	\$160.00
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$3 unitage, per gross ton	\$65.00
10 tons to less carload	75.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Ton lots	21.00¢
Zirconium, 12-15%, contract basis, lump, delivered, per pound of alloy.	
Carload, bulk	6.60¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	8.90¢
Ton lots	9.80¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Carload, bulk	11.00¢
Ton lots, packed	11.25¢
Less ton lots	11.75¢
Boron Agents	
Contract prices per pound of alloy, delivered.	
Ferroboreon, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D.	
Ton lot	\$1.20
Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, delivered.	
Ton lots	\$1.67
Less ton lots	1.79
Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered.	
Less ton lots	\$1.80
Silicaz, contract basis, delivered.	
Ton lots	45.00¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over.	
No. 1	93¢
No. 6	63¢
No. 79	45¢
Bortam, f.o.b. Niagara Falls	
Ton lots, per pound	45¢
Less ton lots, per pound	50¢
Carbortam, f.o.b. Suspension Bridge, N. Y.; freight allowed, TI 15-18%, B 1.00-1.50%, Si 2.5-3.0%, Al 1.0-2.0%.	
Ton lots, per pound	8.625¢
Borosil, f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B	\$6.25



Long Life Predicted for Stainless Roof

Pittsburgh

• • • Recent examination of what is believed to be the world's first stainless steel factory roof showed it to be in such good condition that its service life is apparently almost indefinite. The roof was installed in 1924 at the Pittsburgh Plate Glass Co. plant in Creighton, Pa., 2 years before the development of the 18-8 stainless steel alloys.

The roof covers a building housing reverberatory furnaces for melting glass. Roof level temperatures of 120° to 160°F plus sulfur dioxide fumes from the glass making operations made roofing normally used comparatively short-lived.

The metal used to make the roof 24 years ago was a 12 pct chromium iron produced at the nearby Brackenridge, Pa. plant of Allegheny Ludlum Steel Corp. It is similar to today's type 410, number 7 in popularity among stainless steels.

A section of the roof was removed and inspected in January by Allegheny Ludlum metallurgists. The sample selected appeared to be somewhat more corroded than the rest of the roof. However, when the remainder of the paint and the original mill box annealed scale had been removed, there appeared to be no concentrated corrosion at all. The original purchase order specified 24 gage sheet, and the sample examined showed no loss in thickness either through corrosion or erosion.

Awaits Federal Projects

Seattle

• • • Steel men in this area believe that the cream of the market is gone for bar stock with very little private construction going on but that the Northwest area has enough federal money projects coming in to keep the steel mills busy throughout the next year at least without a slump in the rate of production.

Slated for Repairs

Buffalo

• • • The Tonawanda Iron Div. furnace of the American Radiator & Standard Sanitary Corp. now is scheduled to suspend operations about May 1 for complete rehabilitation, which will take about 2 months. Previously the work had been scheduled to start around Apr. 1.

WAREHOUSE
STOCKS
OF

ALLOY BARS

ROUNDS
SQUARES
HEXAGONS

Hot Rolled.
1/2" to 10" Rd.

Cold Drawn.
1/8" to 4 1/2" Rd.
3/16" to 2" Sq.
3/8" to 2 1/2" Hex.

AIRCRAFT

AMS—6260
6270
6272
6280
6322
6324
6415
6320 Hex.

BESSEMER

B1113

CARBON

1045 H.R.

FORGINGS

WRITE FOR
OUR MONTHLY
STOCK LIST

HY-ALLOY STEELS CO.

30 N. LASALLE
CHICAGO 2, ILL.
RAN 5253

THIS TRANSCONTINENTAL RAILROAD BOUGHT

NINETEEN BROWNING'S

IN THE LAST FOUR YEARS...OVER 100 SINCE 1906



BROWNING

LOCOMOTIVE, WAGON,
TRUCK and TU-CONTROL

Cranes

THE new Browning M Series Locomotive Cranes are handling all types of heavy maintenance-of-way work for this class 1 railroad.

Bridge and roadway crews call for the Browning Diesels from all points on the transcontinental line—in fact it is hard to locate the Brownings from day to day.

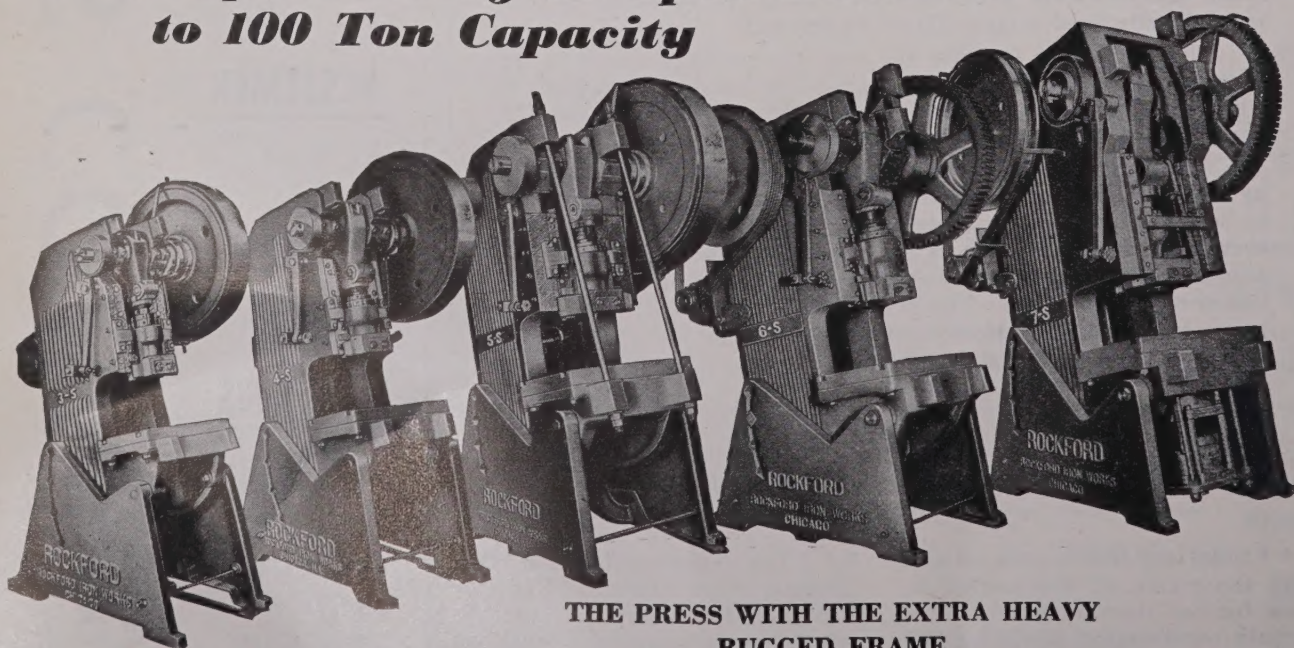
Combining typical Browning ruggedness, long range mobility and easy operation the M Series Diesel has the versatility to handle clamshell, magnet, hookblock, piledriver and crane work on your job dependably and economically.

Bulletin No. 114718 describes new Browning features of design, construction and operation. Write for it today.

THE BROWNING CRANE & SHOVEL CO.

16221 WATERLOO ROAD, CLEVELAND 10, OHIO

***One of the Oldest Manufacturers of Presses
Now Specializing in Open Back Inclinals
to 100 Ton Capacity***



**THE PRESS WITH THE EXTRA HEAVY
RUGGED FRAME**

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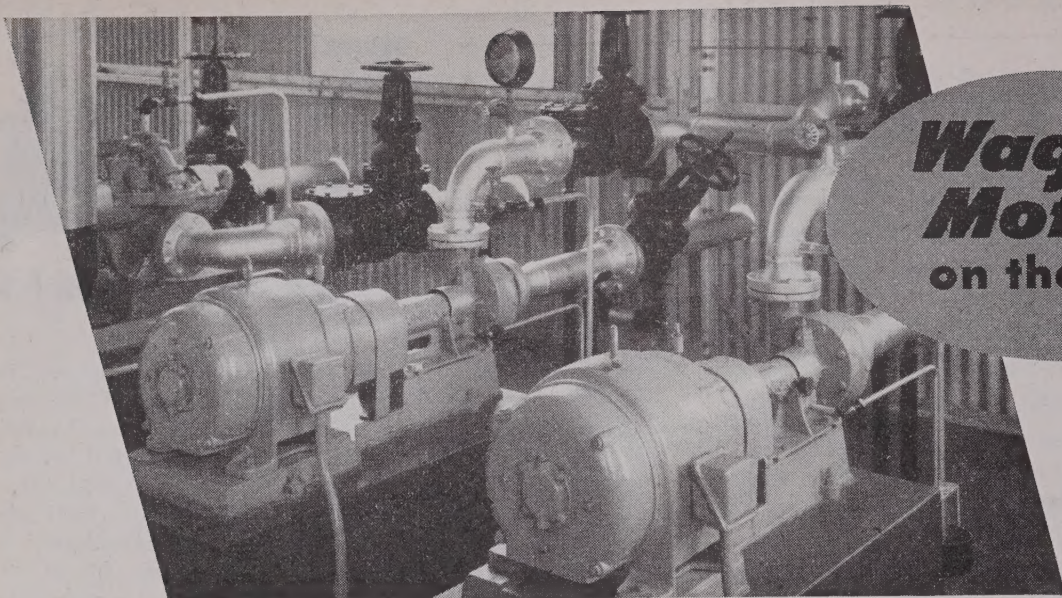


DEAR CUSTOMER

• **BUYER'S MARKET**—We see in the daily pulps that Mr. B. F. Fairless, president of U. S. Steel Corp., has recognized the incipient arrival of the "BUYER'S MARKET" in steel. That just about cleans up the cycle of idle chatter about the "Buyer's Market"—and pulls the curtain on one of the strangest vaudeville acts that sales managers have ever staged. In various lines, ever since the war ended, we have seen courageous selling bosses making press statements welcoming the days when competition would again be tough in selling their line of merchandise—this public disclaimer of fear seemed to take the place of the sulphur and molasses previously taken to purify the blood stream. At the same time those very same sales managers could be heard whistling "river stay 'way from my door" out of the other corner of their mouths. This combination whistling-orating act is about done. When Mr. Fairless' own buyer's market arrives, that tired phrase will be about ready for the mothballs—and the writing fraternity will be out for a new golden pair of words to kick about.

• **NO DICE**—The faces of the whole IRON AGE staff are set and almost grim this month—it goes hard to see the whole advertising world talking about General Motors' plan to spend \$200 million promoting its new models, and IRON AGE working on a goal of 7500 advertising pages this year, but no possibility of the two getting together on "the thing."

• **SENTIMENTAL INTEREST** — Among the 70 odd newspaper clippings quoting the IRON AGE annual review issue was a touching item quoting the Chesapeake and Ohio railroad house organ. It was an item called "IRON AGE Love," and had to do with young hearts under an old forge. Luce's Press Clipping service dutifully underlined the mention of "IRON AGE," and sent it to us. We dutifully paid the \$.07 for the clip.



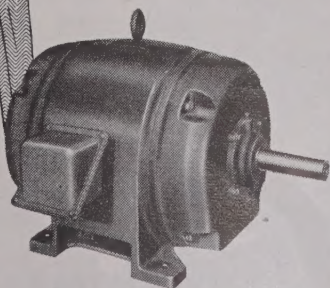
**Wagner
Motors**
on the job . . .

In pumping applications— where **DEPENDABILITY** Counts

Fitting the right motor to a pump is not a problem of designing and building a special motor, but one of choosing a standard design of Wagner motor suited to the job . . . they are diversified in design and can be readily adapted to a wide range of pump applications.

Wagner Motors are chosen for thousands of pumps because they are reliable—they hold up under the tough going expected of pump motors . . . They require very little attention—Wagner Motors are designed to keep maintenance at a minimum . . . They give the kind of service you want—more than fifty-five years of motor building experience stands behind every motor bearing the Wagner name, and every motor built by Wagner reflects the value of this experience.

Improve the performance, economy and dependability of your pumps by applying Wagner Quality Motors. Bulletin MU-185 gives information on the complete line. Twenty-nine sales and service branches, in principal cities, are ready to help you on any motor problem. In addition, almost 500 authorized motor repair shops provide speedy, nationwide service facilities.



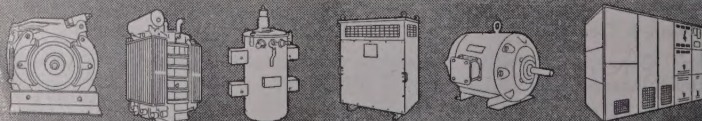
The installation above shows Wagner splash-proof polyphase motors driving water circulating pumps at a large oil-processing plant in Louisiana.

Wagner Electric Corporation

6403 PLYMOUTH AVE., ST. LOUIS 14, MO., U. S. A.



Consult Wagner Engineers on all Electric Motor Problems



BRIDGE BRAKES • POWER AND DISTRIBUTION TRANSFORMERS • MOTORS • UNIT SUBSTATIONS

ELECTRICAL EQUIPMENT AND AUTOMOTIVE BRAKE PRODUCTS